CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

4.1. Introduction

This chapter describes the environmental consequences on the TVA public land of Watts Bar Reservoir potentially affected by the three alternatives. Under all three alternatives, previously unplanned land includes strips of retained land fronting TVA sale tracts. These retained strips of TVA public land that are encumbered with water access rights, have been allocated to Zone 7, Shoreline Access, in accordance with the SMI decision of 1999. Approximately 15 percent (2,388 acres) of TVA public land, which comprises 340 shoreline miles, on Watts Bar Reservoir is proposed for allocation to Zone 7 (Shoreline Access). As explained in Section 1.3 in this EIS, land in the Shoreline Access Zone would be categorized as shoreline protection, residential mitigation, and managed residential under the TVA SMP. Review of private water use facility requests in Zone 7 would include consideration of the site's shoreline categorization status to ensure that environmental impacts would be negligible. Protective measures presently in place under TVA's land use approval process and SMI (TVA, 1998a) would reduce or minimize impacts of residential development of private property.

Under the No Action Alternative, the land use allocation categories assigned to each parcel in the 1988 Plan would remain in effect. Under the Action Alternatives B and C, TVA would update the allocations originally designated for each parcel in the 1988 Plan to reflect the land use zones defined in Table 2.1-2 of this EIS. Action Alternatives B and C incorporate alternative land use zone allocations for 18 parcels and the Integrated Resource Management Plan (IRM), see Appendix B.

4.2. Terrestrial Ecology (Plant and Animal Communities)

Terrestrial Ecology on Watts Bar Reservoir lands could be impacted by management scenarios dictated by land use allocations. Each of the land use Zone designations allow for specific uses (see Chapter 2, Table 2.1-3) which would have individual and specific impacts on terrestrial ecology.

In most cases, the least environmental impacts to terrestrial animals and vegetation on a reservoir wide basis would occur on lands allocated to Zones 3 and 4, where land is managed for sensitive resources and maintenance of wildlife habitat. Conversely, the greatest potential for negative affects on general terrestrial ecology would occur on lands allocated to Zone 5, which allows for a variety of commercial and industrial development scenarios. While a range of impacts from minimal to extensive could occur on lands allocated to Zone 6 (Recreation), the effects on the terrestrial ecology resources would depend on the type and extent of any recreation development.

The majority of parcels of Watts Bar Reservoir land that would be allocated to Zone 5 and 6 and developed under Alternatives A and B are currently in forested habitat condition. Loss of these forests would accompany land clearing for industry, golf course, or residential construction. These areas would be permanently converted to non-forest conditions, or in

situations where some forested areas were left intact they would essentially be small islands of “habitat” that would have much less value to area wildlife species.

Development entails disturbances and changes that often foster the establishment of invasive terrestrial animals and other species that are symptomatic of disturbance such as brown-headed cowbirds, European starlings, house sparrows, rock pigeons, striped skunks and opossums. Large-scale residential developments can also lead to increased wildlife “nuisance” problems where animals such as white-tailed deer, raccoons, and beaver may cause garden crop or ornamental shrub damage when their natural habitats are encroached upon.

Additionally, under any development scenario, an increased representation by invasive plant species that typically inhabit edge habitats would be expected. In order to minimize the potential for the introduction of invasive plant species on TVA owned or transferred properties, any development scenario would include the following conditions and requirements:

- Landscaping activities on developed properties would not include the use of plants listed as Rank 1 “Severe Threat”, Rank 2 “Significant Threat”, and Rank 3 “Lesser Threat” on the Tennessee Exotic Pest Plant Councils list of Invasive Exotic Pest Plants in Tennessee (Appendix C Table C-5).

- Re-vegetation and erosion control work would utilize seed mixes comprised of native species or non-invasive non-native species (Appendix C, Table C-6).

Only 3.7 percent of the land base in the state of Tennessee is in public ownership (Tennessee State Recreation Plan, 2003-2008). Alternatives that develop TVA land would reduce this percentage and reduce land available for wildlife habitat and informal public use. This has been an expressed concern of many stakeholders. Cumulative impacts to terrestrial ecological resources are ongoing and likely to continue in the Watts Bar Reservoir area, regardless of any action taken by TVA or the Alternative selected. This is due to the amount of private land that borders TVA retained properties. These private lands are developing at an increasingly rapid pace, particularly for residential housing purposes throughout the Watts Bar Reservoir area. Currently there are over 17 thousand acres of platted residential property adjacent to Watts Bar Reservoir, which is a thousand acres greater than the total amount of TVA public land being planned on the Reservoir. TVA constantly receives inquiries about new potential development areas. It is estimated that approximately 50 percent of the platted area has already been converted to residential housing with complete conversion of most of these areas anticipated. A variety of terrestrial habitats are being impacted through conversion to residential housing including forests of various ages and open-land in multiple successional stages. While some types of wildlife and vegetation can adapt to this alteration of the habitat, many species cannot and will no longer be found in these areas.

Alternative A - The No Action Alternative; Under the 1988 plan, several large parcels of land are allocated for developed uses that would fall under Zone 5 and 6. The former Clinch River Breeder Reactor site parcels 142, 143, 145, 147 and 148 (1,071 acres) are allocated for Economic Development. During the interim, the site has provided several timber harvests and TVA has granted a short-term revocable land use permit to the Tennessee Wildlife Resources Agency (TWRA) to use these parcels as part of the Oak Ridge Reservation Wildlife Management Area (ORR WMA). These parcels provide

substantial high quality habitat for a variety of terrestrial animal and plant species including high density populations of white-tailed deer and eastern wild turkey which are an important part of the TWRA managed hunts on the ORR WMA.

Another area with significant acreages allocated for developed uses is the Lowe's Branch site which includes parcels 297, 298, and 299 and total about 650 acres. Following the 1988 plan, these parcels have been managed in the interim for forestry and wildlife habitat development, and have received extensive use for a variety of informal recreation activities by the general public, especially for white-tailed deer hunting. In the late 1990's TVA identified significant abuse to portions of this property including trash dumping, disposal of dead livestock, and severe off road vehicle impacts. In an effort to control these abuses and better manage the area, TVA incorporated this area into its Resource Management Plan and Environmental Assessment for the Lower Watts Bar Unit (TVA, 2000). This process and plan led to the gating and control of land use abuses and the development of stakeholder partnerships (Quail Unlimited) to help better manage the site for wildlife resources.

Adoption of this alternative could potentially impact over 1,500 acres of high quality terrestrial resources habitat at the former Clinch River Breeder site and the Lowe's Branch site. The parcels are allocated for industrial and commercial development in the 1988 Plan and would be developed in the future, resulting in the loss of interim uses for informal recreation such as the TWRA lease. There is also an additional 1,900 acres of TVA property scattered across the reservoir that, under the 1988 Plan, might be developed for commercial recreation. Therefore, under this alternative, there are over 3,400 acres or approximately 21 percent of the TVA land base on Watts Bar Reservoir terrestrial ecological resources would be adversely impacted. This alternative would not include an the IRM Plan which would provide a long-term strategy and budget for the management of all natural resources and recreation on Watts Bar Reservoir.

Alternative B – Balanced Development and Recreation; Under this alternative TVA would allocate approximately 2,278 acres (14 percent) of the TVA public land base on Watts Bar Reservoir to Zone 5 (Economic Development) which includes a "mixed-use" residential component. This is 35 percent more than the 1,471 acres allocated for industrial and commercial development in the1988 plan (Alternative A), which does not include any "mixed-use" development components. Therefore, impacts to terrestrial ecological resources would be greatest under this Alternative. Impacts would be similar to Alternative A and would include the loss of interior forest bird habitat and loss of an Important Bird Area (TWRA, National Audubon Society, Birdlife International) designation potential, more habitat fragmentation, and a concurrent increase in exotic invasive plants and animals. More specifically, this alternative could affect the habitat for several Birds of Conservation Concern (USFWS 2002) including chuck-will's widow, whip-poor-will, Acadian flycatcher, wood thrush, prairie warbler, prothonotary warbler, worm-eating warbler and Kentucky warbler. The Louisiana waterthrush also occurs in this region, but suitable habitat for this species is very limited on TVA lands under consideration therefore TVA's actions would have little effect on it.

From a recreation user perspective, this alternative would lessen opportunities for informal recreation pursuits such as hunting and wildlife observation. Specifically, selection of this alternative would eliminate current stakeholder partnership opportunities and activities on parcels 297 and 299 as well as eliminate from consideration a request from TWRA for the transfer of parcels 295, 297, 298, and 299 from TVA for inclusion in their Wildlife Management Area program. Additionally, this alternative would eliminate the current

wildlife management area hunting regulation agreement with TWRA for the former Clinch River Breeder Reactor Site area which includes parcels 142, 143, 145, 147, and 148.

This alternative would include the incorporation of an IRM plan (see Appendix B) for all parcels allocated to Zones 2, 3, 4 and 6, which would result in enhanced management and public use opportunities on these areas scattered around the reservoir. However, these enhanced opportunities and management regimes would not offset the loss of an additional approximate 1,000 acres of Zone 4 and 6 land and associated terrestrial ecological resources and public use opportunities on the reservoir.

Selection of Alternative B would result in significant impacts to terrestrial ecological resources and associated public uses of these resources on a reservoir wide basis.

Alternative C – Balanced Conservation and Recreation; Under this action alternative TVA would allocate approximately 32 percent (5,288 acres) of the current public land base on Watts Bar Reservoir to Zone 4 (Natural Resources Conservation management). This is 12 percent more than the No Action Alternative and 14 percent more than Alternative B. Impacts to terrestrial ecological resources under this alternative would be less than under Alternatives A or B. Selection of this alternative would protect more interior forest bird habitat, reduce habitat fragmentation potential, and lessen the occurrence of invasive, exotic plant and animal species on a reservoir wide basis. This alternative would also be considered beneficial to most of the Birds of Conservation Concern species as described under Alternative B.

From a recreation users' perspective, this alternative would expand opportunities for informal pursuits, such as wildlife and nature observation and hunting. Specifically, selection of this alternative would maintain current stakeholder partnership opportunities and activities on parcels 297 and 299 and keep open consideration of TWRA's request for the transfer of parcels 295, 297, 298, and 299 for inclusion in their Wildlife Management Area program. Additionally, this alternative would change the allocation of the former Clinch River Breeder site (parcels 142, 143, 145, 147, and 148) from Zone 5 to Zone 4. This reallocation would maintain the area's current natural state and allow TWRA to continue their interim management agreement.

This alternative would incorporate an IRM plan for given parcels allocated to Zones 2, 3, 4 and 6 (see Appendix B). An IRM plan would result in enhanced management and public use opportunities on these areas scattered around the reservoir. Implementation of the IRM plan would have beneficial affects on all terrestrial ecological resources on a reservoir wide basis with the incorporation of various management activities, including enhanced inventory of forest and wildlife resources, exotic-invasive plant control, native warm season grass establishment and enhancement in partnership with Quail Unlimited, enhanced food plot management in partnership with the National Turkey Federation, and expanded cooperation with TWRA in the management of wildlife management areas currently under land use permits from TVA. Specifically this alternative would allow for continued management of natural resources on parcels 295, 297, 298 and 299 with the possibility of designating a portion of this area as an Important Bird Area in conjunction with TWRA and the incorporation of prescribed burning regimes to better manage groups of wildlife species, in conjunction with the Tennessee Division of Forestry. Specific IRM site management activities would result in minor short-term insignificant impacts on terrestrial ecological resources but would have long-term beneficial impacts.

Selection of Alternative C, with the associated IRM Plan, would have the greatest benefit for terrestrial ecological resources.

4.3. Sensitive (Endangered and Threatened) Species

4.3.1. Plants

Most of the potential for adverse effects to rare plant species, including threatened and endangered species is dependent on how land is used and impacts from changes in the allocated land use. For example, land allocated to Zone 3 or 4, which have little or no activities like soil disturbances, would be beneficial to a protected plant species. However, a change of allocation of a parcel to Zone 5 or Zone 6 which allows a soil disturbance could result in a loss of protective status for any protected species on that parcel. Such changes would facilitate changes in land use and land cover. Potential direct effects include ground disturbance that could result in the physical destruction and loss of sensitive plant species. Also, changes in land use could indirectly affect some sensitive plants by subtly affecting the habitats of some sensitive plants. Examples of such potential indirect effects include changes in the amount of light, soil moisture, and drainage patterns

Overall, no populations of federally-listed plants are known to occur on Watts Bar Reservoir lands. Thirty-four species of state listed threatened and endangered plants are reported from within a five mile radius of Watts Bar Reservoir with 12 species occupying areas directly in or adjacent to the Reservoir. The remaining 18 species are found within five miles of Watts Bar Reservoir and would not be impacted by any of the alternatives.

Seven of the 12 HPAs (Habitat Protection Areas) on Watts Bar Reservoir have been designated for protection of State listed plant species. These are on land parcels allocated to Zone 3 (Sensitive Resource Management) and contain habitat for five of the 13 state listed threatened and endangered plant species. Spreading False Foxglove a state listed Threatened species is protected at Grassy Creek, Marble Bluff, Polecat Creek Slopes, Rayburn Bridge, Sugar Grove and Stowe Bluff; Appalachian bug bane, a state listed threatened species is protected at Grassy Creek and Stowe Bluff; Northern bush-honeysuckle, a state listed threatened species occurs within Marney Bluff and Stowe Bluff; Mountain honeysuckle, a species of special concern is protected at Sugar Grove and Shining ladies'-tresses, a state listed threatened orchid is protected at Grassy Creek. The remaining eight rare plant species occur in Zone 1 (Non-TVA Shoreline), Zone 4 (Natural Resource Conservation), Zone 6 (Recreation), and Zone 7 (Shoreline Access), see Table 4.3-1.

A majority of the rare plant species occur within Zone 1, Zone 3 (parcels 65, 91, 94, 146, 152, 194 and 196), Zone 4 (parcels 70 and 126), Zone 6 (parcel 121), and Zone 7 (parcels 61, 81, 128 and 248), see Section 3.3.1. The rare plant communities occurring in Zone 1 (Flowage) could incur minor impacts by the changing water levels resulting from normal river and reservoir operations. Since the HPAs and the amount of land designated to Zone 3 (Sensitive resource management areas) would not change under any of the alternatives, there would be no impacts to the rare plant communities found on parcels within Zone 3. Although the amount of land varies with the alternative, rare plants occurring on Zone 4 would likewise incur the benefits of protection from adverse activities. There could be impacts to the rare plant species occurring on Zones 2, 5, 6, and 7 primarily from the construction of infrastructure to support their purpose; however these and any other populations of listed species that might be discovered in the future would be subjected to TVA environmental review should individual projects or changes in land use be proposed.

Accordingly, appropriate protective or mitigative measures would be implemented as required to protect these sensitive plant resources.

The IRM plan provides for a survey of federally listed species on Watts Bar Reservoir lands, Virginia Spirea (Listed Threatened) and Cumberland Rosemary (Listed Threatened) at the mouth of Whites creek near Whites Creek Small Wild Area (Parcel 233) may have habitat suitable for these federally rare species. Identifying new individuals and habitat for these species would be beneficial for their future.

Alternative A - The No Action Alternative; As described above, there are no known populations of federally-listed plants Watts Bar Reservoir lands, therefore there would be no impacts. Also there would be no direct or indirect impacts to state listed or rare plants under Alternative B.

Under the No Action Alternative about 58 percent of the total TVA owned land area (9,400 acres) would be allocated to Zones 2, 5, 6, and 7 where impacts to rare plants would be most likely to occur. However, 42 percent (6,800 acres) of the total TVA owned land area, would be allocated to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. Adoption of the No Action Alternative would result in insignificant cumulative impacts to the rare plants on Watts Bar Reservoir.

Alternative B - Balanced Development and Recreation; There are no known populations of federally-listed plants on Watts Bar Reservoir lands and no state-listed or rare plants occur within any of the 18 parcels considered for allocation changes under this alternative (See Table 4.3-1). Therefore there would be no direct impacts to federal and state listed, and rare plants under Alternative B.

Under the Alternative B about 60 percent of the total TVA owned land area would be allocated to Zones 2, 5, 6, and 7 where impacts to rare plants would be most likely to occur. However, 40 percent of the total TVA owned land area, would be allocated to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. Although slightly greater than the No Action Alternative, adoption of Alternative B would result in insignificant cumulative impacts to the rare plants on Watts Bar Reservoir.

Alternative C - Balanced Conservation and Recreation; There are no known populations of federally-listed plants on Watts Bar Reservoir lands and no state-listed or rare plants occur within any of the 18 parcels considered for allocation changes under this alternative. Therefore there would be no direct or indirect impacts to federal and state listed, and rare plants under Alternative C.

Under the Alternative C about 46 percent of the total TVA owned land area would be allocated to Zones 2, 5, 6, and 7 where impacts to rare plants would be most likely to occur. However, 54 percent of the total TVA owned land area, would be allocated to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. With the least impacts of all the alternatives, adoption of Alternative C would result in no cumulative impacts to the rare plants on Watts Bar Reservoir.

Table 4.3-1 Rare Plant Species occurring on Watts Bar Reservoir Land for All Alternatives, Listed by Zone.

Zone[1]	Parcel # or River Mile[2]	Rare Plants Present	Habitat Protection Area
1 (2)	CRM 3	Fetter-bush (*Leucothoe racemosa*)	
1	TRM 593	American barberry (*Berberis canadensis*), Mountain honeysuckle (*Lonicera dioica*)	
1	CRM 10.5, 12.5	Spreading false-foxglove (*Aureolaria patula*)	
1	CRM 19.5	Canada lily (*Lilium canadense*), Spreading false-foxglove (*Aureolaria patula*)	
1	CRM 12.5	Large-flowered barbara's-buttons (*Marshallia grandiflora*), Pursh's wild-petunia (*Ruellia purshiana*)	
1	CRM 11.4	Northern white cedar (*Thuja occidentalis*)	
3	Parcel 196	Spreading false-foxglove (*Aureolaria patula*), Appalachian bugbane (*Cimicifuga rubifolia*), Northern bush-honeysuckle (*Diervilla lonicera*)	Stowe Bluff
3	Parcel 65	Northern bush-honeysuckle (*Diervilla lonicera*)	Marney Bluff
3	Parcel 91	Spreading false-foxglove (*Aureolaria patula*)	Marble Bluff
3	Parcel 94	Spreading false-foxglove (*Aureolaria patula*)	Polecat Creek Slopes
3	Parcel 194	Spreading false-foxglove (*Aureolaria patula*)	Rayburn Bridge
3	Parcel 152	Spreading false-foxglove (*Aureolaria patula*)	Sugar Grove
3	Parcel 146	Spreading false-foxglove (*Aureolaria patula*), Appalachian bugbane (*Cimicifuga rubifolia*), Shining ladies'-tresses (*Spiranthes lucida*)	Grassy Creek
3	Parcel 152	Mountain honeysuckle (*Lonicera dioica*)	Sugar Grove
4	Parcel 70	Spreading false-foxglove (*Aureolaria patula*)	
4	Parcel 126	Spreading false-foxglove (*Aureolaria patula*), Northern bush-honeysuckle (*Diervilla lonicera*)	
6	Parcel 121	Mountain bush-honeysuckle (*Diervilla rivularis*)	
7	Parcel 248	Spreading false-foxglove (*Aureolaria patula*)	
7	Parcel 61	Spreading false-foxglove (*Aureolaria patula*)	
7	Parcel 81	Spreading false-foxglove (*Aureolaria patula*)	
7	Parcel 128	Appalachian bugbane (*Cimicifuga rubifolia*)	

* Zone 1: Flowage, Zone 2: Project operations, Zone 3: Sensitive Resource Mgt, Zone 4: Natural resource conservation, Zone 6: recreation, Zone 7: Shoreline access.

4.3.2. Terrestrial Animals

Land use allocation changes (see Table 2.1-2) would have varying degrees of potential affect on rare and sensitive terrestrial animals and sensitive ecological areas (e.g., caves and heron colonies) on the Watts Bar Reservoir lands. In general, the potential to adversely affect these sensitive resources depends on the type of action, specifically, the degree of site or ground disturbance, and whether or not measures were taken to protect sensitive resources.

Adverse effects to sensitive terrestrial animals are not likely to occur on parcels allocated to Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation,

respectively). These two use allocations, especially Zone 3, are designed to provide protection to sensitive resources. Proposed actions within these two zones would typically be initiated by TVA, and actions that could adversely affect threatened or endangered species would not be considered. Proposed management actions within Zones 3 and 4 would typically be designed to have beneficial effects to rare and sensitive terrestrial animals and ecological areas.

Future actions in Zone 6 (Developed Recreation) parcels could have minimal to extensive impacts to these sensitive species and their habitats, depending upon the type of recreation activities implemented. In particular, recreational activities involving extensive vegetation clearing or widespread landscape alteration would have a high potential to adversely affect terrestrial animals, including threatened and endangered species.

Because they would likely involve habitat alterations (e.g. vegetation clearing and ground disturbance), future activities on Zone 5 (Economic Development) parcels would have a generally high potential to affect sensitive terrestrial animals and their habitats as well as sensitive ecological areas if they were present on or near the subject parcel. This potential would be most pronounced on parcels that were reallocated from Zone 4 to Zone 5.

Potential impacts from site-disturbing activities would be greatly reduced through the use of best management practices (BMPs) and other conservation initiatives. Such measures would be conditions of TVA approval of land use requests. Likewise, potential effects to populations of rare terrestrial animals and sensitive ecological areas would be considered during TVA environmental reviews associated with specific project proposals and land use requests. Thus, the allocation of land use under any of the alternatives is not likely to adversely affect threatened or endangered terrestrial animals.

Under alternatives B and C, the goals outlined in the IRM Plan would enhance and protect the area for wildlife. Long-range management goals for TVA properties on Watts Bar Reservoir would take into account bald eagle and osprey nests, as well as heron colonies on or adjacent to TVA property. Management plans would also include measures to protect and enhance other populations of rare terrestrial species on TVA property. Implementation of the IRM Plan would have some temporary negative impacts during periods when vegetation management is underway, but there would be overall long term benefits to terrestrial animals as a result of the IRM Plan. The greatest benefits would likely occur under Alternative C.

Gray bat roosting has been documented on only one parcel within the Watts Bar property. Because gray bats forage over water, land management activities would not have any direct impacts to the gray bats' foraging activities. This parcel has been designated as Zone 3 (Sensitive Resource Management). This allocation would provide the roost cave and its inhabitants adequate protection.

Impacts to hellbenders are not expected under any of the alternatives, provided adequate BMPs are used. Appropriate BMPs would be used to control sedimentation and runoff into rivers and streams that may contain hellbenders.

Habitat for four-toed salamanders, Tennessee cave salamanders, least bitterns, and eastern slender glass lizards does not occur within parcels subject to reallocation. Therefore, no impacts to these species are expected.

Habitat for sharp-shined hawks, Bachman's sparrows, common barn owls, eastern small-footed bats, southern bog lemming, southeastern shrews, and northern pine snakes exists within the counties encompassing the Watts Bar Reservoir properties. Although no historic records occur for these species on Watts Bar property, they may occur if suitable habitat is available.

Alternative A- No Action Alternative; Under this alternative, TVA would continue to use the 1988 Watts Bar Reservoir Land Management Plan, SMI, and other previous commitments to guide the management of the total 16,000 acres on the reservoir. Alternative A calls for allocating a lesser percentage of land (9 percent) for economic development (Zone 5) than Alternative B (14 percent), but with a greater percentage than Alternative C (one percent). Therefore, adoption of this alternative has a greater potential to cause adverse impacts to rare terrestrial animals than Alternative C, but less than Alternative B.

At the former Clinch River Breeder Reactor site, under Alternatives A and B, Parcels 144 and 146 (totaling147 acres) would be designated as Zone 3. Another 1,071 acres (i.e., Parcels 142, 143, 145, 147, and 148) would be placed in Zone 5. The two parcels allocated as Zone 3 would be separated, and no protected corridors would connect them. State listed southeastern shrews and Bachman's sparrows, which have been recorded in the area but not on the parcels, would be locally impacted by development under Alternatives A and B if they occur on these parcels. However, southeastern shrews can be found throughout other Watts Bar properties. Bachman sparrows have not been recorded from the area since 1987. The former Clinch River Breeder Reactor site has low-quality habitat for Bachman's sparrow. Therefore, potential impacts to populations of these species would be minimal. Bald eagles and osprey have been observed roosting and foraging on or near parcels 142 through 148. Site development under Alternative A would affect the potential of these parcels as roosting sites. However, other suitable roost sites for these species exist within the Watts Bar area. Therefore, potential impacts to roosting and foraging sites would be minimal at the Clinch River Breeder Reactor site.

If Alternative A or B is chosen, the Grassy Creek Habitat Protection Area (Parcel 146), which protects rare plant habitat and also has habitat for listed animal species including eastern small-footed bats, would become a small, isolated patch of protected area. Small, isolated natural areas adjacent to developed areas are subject to degradation from exotic and invasive species, brown-headed cowbird parasitism, predation, and other factors. Thus, Grassy Creek Habitat Protection Area could be affected indirectly under Alternatives A or B.

Parcels 295 through 299 (the Lowe's Branch area) contain habitat for roosting and nesting bald eagles and osprey, although no records are known from here presently. If Alternative A is chosen, 250 acres of land (two parcels) would be allocated to Zone 4. These two parcels are not contiguous, no forested corridors would connect them, and they would be surrounded by areas subject to various amounts of development. Therefore, because the parcels are small and isolated, they would be susceptible to degradation as explained above.

Adoption of the No Action Alternative would minimally add to the cumulative impacts to terrestrial animals of Watts Bar Reservoir. Land activities under Alternative A could result in some additional fragmentation of an already fragmented landscape. Additional shoreline development may begin to limit the roosting and nesting potential of bald eagles, ospreys,

and herons. These species may be limited to nesting on isolated islands and on inland sites further isolated from shoreline development.

Alternative B- Balanced Development and Recreation; Under this alternative, a greater percentage of land would be allocated to industrial and commercial development than under the other alternatives. In general, adoption of this alternative would have the greatest potential to adversely impact wildlife. Land activities that could occur under Alternative B could increase habitat fragmentation and create larger amounts of wildlife disturbances. Adoption of Alternative B would have the greatest potential to result in adverse impacts to terrestrial animals that may occur in the Watts Bar Reservoir properties. Development of Watts Bar shoreline under Alternative B could impact areas with potential for bald eagle, osprey and heron nesting. Site development at the former Clinch River Breeder Reactor Site could degrade the suitability of Parcels 142 through 148 as roosting sites for eagles and ospreys.

As described above, adoption of Alternative B could result in some long-term degradation of the Grassy Creek Habitat Protection Area. Under Alternative B, the Lowe's Branch area would be allocated to Zone 5 and would be subject to various amounts of industrial or commercial development, which could affect the suitability of the area as potential bald eagle and osprey habitat. The heron colony on Parcel 5 could be adversely affected under Alternative B.

Parcel 5 has a historical site for a heron colony which no longer exists due to the loss of pine trees from a recent pine bark beetle infestation. However, some active remnant nests may still be present. Under Alternative B, this parcel would be allocated to Zone 5 (Economic Development). Activities under this allocation could result in adverse effects to these nests. Adverse effects to the colony are not expected under Alternative A or C.

Adoption of Alternative B would result in additional cumulative impacts to the terrestrial animals of Watts Bar Reservoir in that it could likely cause more habitat fragmentation in an already fragmented landscape. As stated above, additional shoreline development could limit the roosting and nesting potential of bald eagles, osprey and herons and force these species to nest on isolated islands and remote inland sites.

Alternative C- Balanced Conservation and Recreation; Under this alternative, a greater amount of land would be allocated to natural resource conservation (Zone 4) than under the other alternatives. About 2,000 to 2,200 more acres would be allocated for natural resource conservation under Alternative C than under Alternatives A or B respectively. These additional acres would provide more wildlife habitat and foraging sites, and would afford wildlife greater mobility. Wildlife and their habitats would be less disturbed under Alternative C than under the other alternatives. No impacts are expected to threatened and endangered species under this alternative. The selection of Alternative C is not likely to cause any significant cumulative impacts to sensitive terrestrial animals in the area.

Bald eagles and osprey would benefit most under Alternative C as compared to the other two alternatives. Under this alternative, 900 contiguous acres at Lowe's Branch would be allocated to Zone 4, which would offer protection to bald eagles and osprey that may nest or roost here.

Under Alternative C, all of the former 1,200-acre former Clinch River Breeder Reactor site would be designated as either Zone 3 or 4. Because extensive site disturbance is not likely

within these two zones, sensitive resources at the former Clinch River Breeder Reactor Site would be afforded protection. All parcels would be contiguous, and wildlife would be able to move freely within the location. Thus, adoption of Alternative C would not impact southeastern shrews and Bachman's sparrows on the former Clinch River Breeder Reactor site, if they exist there. Adoption of Alternative C may also offer the best protection to hellbenders that reside in the Clinch River nearby, as activities that could result in erosion would be unlikely. Adoption of Alternative C may also improve the wildlife potential of nearby Grubb and Jones Islands by providing a natural buffer along the Clinch River.

4.3.3. Aquatic Animals

In general, ground disturbance activities which influence riparian areas (and therefore, water quality) have the greatest potential for impacting rare and sensitive aquatic species. That is, the greater the soil disturbance from an activity the greater the potential for adverse impacts to water quality due to run-off and the resulting sediment pollution impacts to habitat. Therefore, in most land use allocation situations Zone 5 (Economic Development) would have the most potential for impacts to rare and sensitive aquatic species, while Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation) would have the least adverse impacts. The impact from the allocation of other Zones would vary depending on the degree of ground disturbance activities.

Alternative A – No Action; Under the current management plan, Watts Bar Reservoir land parcels (e.g., 143, 148, 297-298, etc.) allocated as industrial/commercial have protected mollusk species in the river adjacent them. The industrial/commercial activities anticipated on these land parcels, could have some minor impacts to these species from typical impacts like storm water run-off or sewage outfalls. Existing environmental review procedures for proposed projects on these parcels (including compliance with ESA) would assure that TVA actions would not likely adversely affect the habitat of protected aquatic species in adjacent areas. Ground disturbance activities associated with these land parcels (Zone 5) could have minor impacts to sensitive aquatic animal species (mollusks and fish) found in the reservoir and tailwater. The current management plan would have no impact on sensitive aquatic animal species (fish) in the flowage areas. Overall, allocating land in this alternative is not likely to affect sensitive aquatic species.

Action Alternative B – Balanced Development and Recreation; Under Alternative B, parcels 295, 296, 299, and 5 would be changed from natural resource conservation (Zone 4) or recreation (Zone 6), as described in Alternative A, to economic development (Zone 5) use. These areas of Watts Bar Reservoir are adjacent to state-listed fish species, including the flame chub. Although there would be no direct impacts to these species, there would be more opportunity for indirect impacts to these species similar to those described for Alternative A. Cumulative effects from likely potential actions such as the removal of riparian buffers, would continue to degrade water quality and aquatic habitats and reservoir and tailwater species downstream of these parcels. Overall, allocating land in this alternative is not likely to affect sensitive aquatic species.

Action Alternative C – Balanced Conservation and Recreation; Under Alternative C, no parcels would be reallocated to Zone 5, and several parcels (Parcels 143, 145-148, 297, and 298) would be reallocated from Zone 5 (Economic Development) or from Zone 6 (Recreation) (Parcels 9, 10, and 299) to Zones 3 or 4 (Sensitive Resource Management and Natural Resources Conservation). Therefore, the impacts to sensitive aquatic animals from activities on Parcels 295, 296, 299, and 5 (described under Alternative B) would not

occur. Overall, allocating land in this alternative is not likely to affect sensitive aquatic species.

The cumulative effects of these actions could result in improved riparian buffer zones, and may help improve water quality and aquatic habitats downstream of the project areas, including areas where sensitive aquatic species are known to occur. This alternative would provide the greatest degree of protection to sensitive aquatic species known from Watts Bar Reservoir and its tributary streams.

4.4. Managed Areas and Sensitive Ecological Sites

Overall, the development and implementation of TVA reservoir land plans has historically benefited the efficient management and protection of natural areas and sensitive ecological sites. TVA land planning allocates designated TVA Natural Areas that are Habitat HPAs (Habitat Protection Areas), ECSAs (Ecological Study Areas), and SMAs (Small Wild Areas) into Zone 3 (Sensitive Resource Management). Likewise, WOAs (Wildlife Observation Areas) are designated into Zone 4 (Natural Resource Conservation). In this environmental review of the alternatives for lands planning on Watts Bar Reservoir only a few specific proposed allocations have the potential to negatively affect this resource area.

Under any of the alternative, there would be no impact to the NRI-listed streams that are in the vicinity of Watts Bar Reservoir (see Section 3.4). The NRI-listed segments of the Emory River, Little Tennessee River, and Piney River would be upstream to any proposed actions resulting from allocating land on Watts Bar Reservoir and not likely to incur any impacts.

Two natural areas designation changes are proposed under Alternatives B and C. The first is to add Parcel 237 to the Whites Creek SWA in an effort to expand the opportunities afforded by the natural area. The second change is to remove the “Ecological Study Area” designation from Thief Neck Island, as the island is no longer used by local research institutions as a study area. Therefore TVA biologists propose that the area remain in Zone 3 but with no natural areas status. This change is not expected to change the public use nor the protection of the island.

Under Alternatives B and C, the guidance of natural resources management objectives and implementation of the proposed activities specific to natural areas management in the IRM Plan for Watts Bar Reservoir are:

- The IRM objective to maintain and enhance “ecological diversity in consideration of adjacent land uses and surrounding ecological conditions” will complement the management objectives for natural areas (see Section 3.4) on the reservoir.

- The periodic monitoring proposed in IRM Plan is essential to evaluate current natural area designations (e.g., small wild areas and habitat protection areas), to identify new areas, to inventory rare species and communities, and to protect the areas in keeping with their designated use and management objectives. Monitoring also is essential to determine public use needs, e.g., better signage or road access or trail additions/maintenance.

- The proposed continuation of cooperative relationships with volunteer groups and other agencies in managing, maintaining, and enhancing natural areas are essential to the protection of these resources.

These proposed objectives and activities will result in positive benefits to the overall use and protection of natural areas on the Watts Bar Reservoir.

Alternative A – No Action; Under Alternative A, TVA would continue to use the 1988 Watts Bar Reservoir Land Management Plan as the basis for making land use decisions. Under this scenario land uses would be reviewed on a case by case basis and impacts to natural areas would be evaluated as they are proposed.

Alternative B – Balanced Development and Recreation; Under Alternative B, TVA would allocate some land parcels to increase the number of acres zoned for industrial and commercial development. Acreage zoned for sensitive resource management would remain constant and the acreages zoned for natural resource conservation and developed recreation would decrease. (See Tables 2.2-1 and 2.2-2) Overall, other proposed allocation changes along the reservoir would either not occur adjacent to natural areas or would result in no change in the ecological integrity of natural areas.

There is one potential exception to this conclusion. Under Alternative B, the former Clinch River Breeder Reactor site is largely allocated for industrial and commercial development. Future development of the site (Parcels 142, 143, 145, 147, 148) has the potential to adversely affect the ecological integrity of the Grassy Creek TVA HPA (Parcel 145). The Grassy Creek TVA HPA provides habitat suitable for the Appalachian bugbane (*Cimicifuga rubifolia*), a state-listed plant species, and suitable habitat for ospreys and bald eagles. To avoid direct, indirect, and cumulative effects to the HPA, any future development proposals would need to include a site plan that identifies and mitigates potential impacts to the sensitive resources of the natural area.

The future development of the former Clinch River Breeder Reactor site also has the potential to impact the management objectives of the adjacent ORR WMA, the Oak Ridge National Environmental Research Park Biosphere Reserve, and other USDOE-owned lands. Development of the site may conflict with current land uses and objectives for these managed areas.

Alternative C – Balanced Conservation and Recreation; Under Alternative C, TVA would allocate more land parcels to Zone 4 for natural resource conservation and fewer land parcels to Zone 5 for economic development, (see Tables 2.2-1 and 2.2-2).

Under this alternative, the Zone 5 parcels of the former Clinch River Breeder Reactor site, noted above under Alternative B, would be allocated to Zone 4 (Natural Resource Conservation). Under this alternative, all of the site parcels (Parcels 142 to148) would be allocated to either Zone 3 or Zone 4 and would provide a contiguous parcel of land on the site. This allocation would benefit and complement the management objectives for the Grassy Creek TVA HPA, and would compliment the surrounding land uses managed by USDOE. Overall, other proposed allocation changes along the reservoir would either not occur adjacent to natural areas or would result in no change in the integrity of natural areas.

4.5. Water Quality and Shoreline

Water quality in any particular body of water is influenced by 'point' pollution from specific sources such as industrial and sewage treatment plants, and non-point source (NPS) pollution, which comes from many diffuse sources. Sources of NPS pollution include rainfall or snowmelt runoff which moves over and through the ground, picking up natural and human-made pollutants. These pollutants may eventually be carried into lakes, rivers, wetlands, and other waters. Water quality is also influenced by the condition of the water entering the water body from upstream sources. Most of the water entering Watts Bar Reservoir (86 percent) comes from sources outside its own immediate watershed. These include the inflows of the Clinch River through Melton Hill Dam (19 percent) and the Tennessee and Little Tennessee Rivers through Fort Loudon Dam (67 percent). The remaining 14 percent of the incoming volume is contributed by local inflows from the local 1,834 square miles of the Watts Bar Reservoir Watershed, including direct drainage from TVA reservoir properties.

Increased levels of development and intensive use in a watershed (associated with residential, commercial and other types of development, as in Alternative B), would generally have a negative impact on water quality. Development and intensive land uses typically increase the amount of impervious surfaces (i.e., roofs, roads, paved areas), removes vegetation and exposes soil to erosion, and increases the amount NPS pollution. Results of increased development on a water body can include: increased turbidity and sedimentation, increased levels of nutrients and bacteria from managed lawns and septic systems, increased levels of chemicals and substances toxic to aquatic life and increased storm water pollution and velocity.

Alternative A – No Action; Under Alternative A, the extent to which a proposed land use might affect water quality depends on the nature and extent of development possible under the 1988 Watts Bar Reservoir Land Plan allocations. Proposed land uses under the 1988 Plan are somewhat less restrictive than the proposed new zones. Future residential, industrial, and recreational developments on either TVA or private property have the potential to negatively impact water quality.

Under the No Action Alternative, any proposed use of TVA public land would be evaluated on a case-by-case basis to ensure it fits the allocated use and that the proposed use serves the needs and interests of the public.

The use of vegetated buffer zones and other BMPs (best management practices) would reduce negative effects of riparian vegetation removal associated with development. In addition, protective measures presently in place under TVA's land use approval process and SMI (TVA, 1999) would substantially offset impacts of development of private property. With appropriate environmental reviews and use of existing BMPs, future activities under Alternative A would not significantly impact the reservoir's water quality.

Alternative B - Balanced Development and Recreation; Under Alternative B**,** 916 acres (i.e., Parcels 5, 44, 80, 257, 295, 296, and 299) would move from a less developed status to a potentially more developed status (from a Zone 4 to either a Zone 5 or 6; or from a Zone 6 to a Zone 5 with the possibility of mixed use development). Two tracts (Parcels 120 and 218) totaling 74.3 acres would be reallocated from a Zone 2 or Zone 5 designation to Zone 6.

As mentioned above, development and more intensive land uses typically may have a negative impact on water quality. Additional boat use facilities and boat usage associated with future developed recreation and mixed use development may contribute to additional spills and discharges of fuel and wastewater.

Increases of nutrient loading from NPS can contribute to higher algal mass in the reservoir, which can lead to decreased levels of DO (dissolved oxygen) in the reservoir during periods of stratification. Increases in sediment discharge contribute to the muddy appearance of the water and interfere with the quality of aquatic habitat. Toxic materials such as metals, hydrocarbons, and pesticides in storm water runoff from residential and commercial land uses, streets, and intensively managed lawns can be toxic to aquatic organisms.

The use of BMPs (such as adequate sediment control and the establishment of buffer zones), and low impact design and management concepts (such as porous pavement and constructed wetlands) can help to reduce some of the negative impacts to water quality from increased levels of development. However, if careful design, construction and maintenance practices are not followed, BMPs and low impact design concepts would be less effective in protecting water quality. Prior to any proposed onsite development, TVA would conduct additional environmental reviews relating to specific parcels and recommend appropriate site design and management practices to minimize negative environmental impacts.

With only 50 percent of the 17,000 acres of plated residential areas currently developed, continued development is anticipated to occur around Watts Bar Reservoir. Individual developments can have an adverse impact on water quality during construction due to silting and loss of vegetation, as well as in the future due to more intensive residential land use. While individual developments primarily affect the immediate vicinity and would not be considered a significant impact to the overall reservoir, the cumulative impact of increasing development and levels of impervious cover will have an adverse impact on water quality as land throughout the watershed is developed. Under this alternative, TVA's emphasis on economic development could contribute to this cumulative impact.

Alternative C – Balanced Conservation and Recreation; In general, management of land in less developed status throughout a watershed impacts water quality in a positive manner. Under Alternative C, about 2,232 acres (i.e., Parcels 5, 9, 10, 142, 143, 145, 147, 148, 218, 297, 298, and 299) would move from a more developed zone status (Zone 5 or 6) to a less developed zone status (i.e., Zone 4). The parcels under consideration with this alternative cover approximately 3.48 square miles, or 0.19 percent, of the overall 1,834 square miles in the immediate Watts Bar Reservoir Watershed. Some of these parcels would benefit from the IRM Plan process, which would provide additional land management activities on parcels allocated to Zones 2, 3, 4 and 6. These activities include natural, visual, recreational and cultural resource management, including protection from abuses such as illegal dumping on TVA lands. TVA IRM Plan processes utilize BMPs that are designed to reduce negative impacts on natural resources including water quality. For example, during timber harvest planning and implementation, a 50 foot to 450 foot streamside management buffer zone would be established to protect water resources.

Allocation of these parcels to less developed status would likely have a positive impact to local water quality in proximity to these parcels. As more watershed land develops (both on reservoir and off reservoir), it is likely that having preserved less developed lands will become increasingly important to maintaining water quality in the reservoir. However, in

consideration of all the impacts to water quality from sources outside of reservoir lands, and the relatively small amount of TVA public lands throughout the watershed, allocation of these lands under Alternative C would not likely impact the water quality in the overall reservoir.

4.6. Aquatic Ecology

Impacts to aquatic resources are directly related to changes of the existing natural shoreline conditions. Aquatic resources can be impacted by changes to shoreline (riparian) vegetation, vegetation on backlying lands, and land uses. Shoreline vegetation, particularly trees, provides shade, organic matter (a food source for benthic macroinvertebrates), and shoreline stabilization; and trees provide aquatic habitat (cover) as they fall into the reservoir. Shoreline vegetation and vegetation on backlying land provide a riparian zone which functions to filter pollutants from surface runoff while stabilizing erodible soils. Therefore, there would likely be some degradation of aquatic habitats associated with economic and/or commercial recreational development along the reservoir shoreline under this alternative.

Shoreline development can alter the physical characteristics of adjacent fish and aquatic invertebrate habitats, which can result in dramatic changes in the quality of the fish community. One of the most detrimental effects of shoreline development is the removal of riparian zone vegetation, particularly trees. Removal of this vegetation can result in loss of fish cover and shade, which elevates surface water temperatures. Also, fish spawning habitat, such as gravel and woody cover, can be rendered unsuitable by excessive siltation and erosion, which can occur when riparian vegetation is cleared. Additionally, shoreline development often results in the removal of existing aquatic habitat (i.e., stumps, brush, logs, boulders, etc.) in association with the construction of water use facilities.

Alternative A – The No Action Alternative; Under Alternative A, a substantial number of acres of TVA public land are allocated specifically for the protection of sensitive resources, but the extent of protection provided for natural resources on other allocated parcels varies. Protection of the reservoir's natural shoreline may occur as a secondary result on parcels of TVA public land allocated for uses such as wildlife management and natural areas, as this form of protection has the dual benefit of protecting aquatic animals.

Use of TVA public land below the 745-foot contour has been controlled by land rights of the adjacent property owners. As a result, various development activities below that contour, as well as private development of back-lying land, have resulted in loss of riparian woody vegetation at some sites. Clearing of trees and brush may have accelerated shoreline erosion thereby impacting water quality and aquatic ecology. However, in some cases where shorelines lack woody vegetation and aquatic habitat is poor, placement of shoreline stabilization structures, such as riprap or fixed docks, has improved aquatic habitat.

Under the No Action Alternative, the quality of aquatic habitats associated with various land use allocations would remain similar to the existing conditions. In the future the extent of woody shoreline cover on parcels allocated to Zone 4 is expected to increase as natural succession continues. The littoral (shoreline) zone is the most productive habitat of a reservoir environment. Fish utilize littoral habitats because of their spawning requirements, the availability of submerged cover (i.e., rocks, logs, brush, etc.), and the presence of smaller fish and aquatic invertebrates as a food source for the fingerlings.

Alternative B - Economic Development and Recreation; Alternative B would help promote economic development and commercial recreation by allocating a substantial number of parcels to Zone 5 (Economic Development). The percentage of Zone 5 parcels would increase from 1,471 acres (9 percent of TVA public land under the current plan) to 2,278 acres (14 percent).

Furthermore, approval requirements for proposed developments, such as commercial recreation areas and water-access sites, will require protection of important natural features. The quality of shoreline aquatic habitats would improve with the protective zones mentioned above through the enhanced opportunity for natural succession, as well as protective vegetation management now required through TVA's SMP standards for private water-use facilities. Narrow shoreline strips of TVA land fronting Zone 5 lands can also be maintained in a natural condition since industrial/commercial development seldom requires extensive clearing of shoreline vegetation.

However, under certain circumstances, such as denuded banks, construction of docks and piers, while having short-term negative impacts, can increase fish habitat. Fixed docks and piers, especially those with pilings driven into the substrate, provide shade and cover for fish and aquatic invertebrates. Fixed docks, when combined with habitat improvements such as anchored brush, rock aggregations, log cribs, and/or other forms of cover, can actually enhance the shoreline aquatic habitat.

Development activities resulting from reallocation of Zone 4 parcels to Zone 5 would likely have a negative impact on aquatic ecology in the nearby vicinity. Partial loss of riparian habitat and clearing of land beyond the shoreline management zone could allow runoff of soils, nutrients, fertilizers, and herbicides into streams and wet weather conveyances leading to Watts Bar Reservoir, thereby degrading aquatic habitats. Similarly, commercial recreational development would likely have more impact on aquatic communities adjacent to parcels presently allocated to developed recreation, according to the degree of shoreline and back lying land disturbance.

Alternative C - Conservation and Recreation; Alternative C would increase opportunities to protect and enhance aquatic habitats by allocating nearly one and a half as many acres to Zone 4 (Natural Resource Conservation) than the existing (1988) plan. Under the 1988 Plan, 3,299 acres (20 percent of Watts Bar public lands) were allocated to Zone 4, but under Alternative C, the number of acres increases to 5,288 acres (32 percent of public land), making Zone 4 the dominant public land use for the reservoir.

Zone 4 designations allow the protection or enhancement of aquatic habitats through the reservation of existing natural shorelines, which offers a variety of cover types. The extent of woody shoreline cover on Zone 4 parcels is expected to increase in the future as natural succession continues. The littoral zone is the most productive habitat of a reservoir environment. Fish utilize littoral habitats because of their spawning requirements, the availability of submerged cover (i.e., rocks, logs, brush, etc.), and the presence of smaller fish and aquatic invertebrates as a food source for the fingerlings.

Forest, agricultural, and wildlife management activities in Zone 4 could potentially affect aquatic ecology through runoff of nutrients and soils. These potential impacts would be avoided through careful planning and commitments in this EIS to limit the sizes of activities and use rigorous BMPs during implementation.

Development of the private lands on the reservoir shoreline will likely continue under any alternative. However, more development and shoreline disturbances are likely under Alternative B than Alternative C, and greater impacts to aquatic ecology would be expected. In contrast, aquatic ecology would likely improve under Alternative C because over 2,200 acres of land currently allocated to economic development (Zone 5) and developed recreation (Zone 6) would be re-allocated to the more protective natural resource conservation (Zone 4) designation.

The IRM (Proposed Integrated Resource Management) plan contains the four major resource areas (natural resources, recreation resources, cultural resources, and visual resources) and addresses Zones 2, 3, 4, and 6. It consists of a series of actions that would be implemented over the 10-year Watts Bar Reservoir Land Management Plan horizon. Although aquatic ecology protection/enhancement is not a stated objective of IRM, the measures outlined in the Appendix would have the secondary benefit of protecting aquatic habitats. All construction and maintenance work and forest, agricultural, and wildlife management activities in Zones 3 or 4 could potentially affect aquatic ecology through runoff of nutrients and soils. All soil-disturbing activities (e.g., road construction, timber harvests, etc.) would be implemented using appropriate BMPs to prevent or minimize soil erosion. If permanent or temporary stream crossings are needed, they would comply with appropriate Federal and state permitting requirements as well as any applicable designations and BMPs. Where herbicides are used, these chemicals would be applied following EPA label restrictions and TVA BMPs. Furthermore, any soil-disturbing activities in Zone 6 parcels would also be conducted using BMPs.

By following the appropriate BMP requirements on shorelines or in ephemeral, intermittent or perennial streams, maintenance activities in any of the parcels would not result in significant impacts to aquatic ecology. These watercourses would be protected by standard BMPs designed to minimize erosion and subsequent sedimentation in streams.

4.7. Wetlands and Floodplains

4.7.1. Wetlands

All wetlands, regardless of their ecological significance, are subject to various state and federal mandates and regulations. Specifically, regulatory protection is extended to certain wetlands under Section 404 of the Clean Water Act. In many cases, wetlands are also protected under the Aquatic Resources Alteration Permit (ARAP) program administered by the Tennessee Department of Environmental Protection. Also, TVA is subject to Executive Order 11990 (Protection of Wetlands), which mandates that federal agencies take such actions as may be necessary to "minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands…" Generally, Executive Order 11990 is relevant to TVA actions involving the disposal of land or the granting approvals of water use facilities pursuant to Section 26a of the TVA Act. Consistent with the requirements of Executive Order 11990, to the extent practicable, TVA takes measures to either avoid adverse wetland impacts or mitigate unavoidable effects to wetlands as a result of such actions.

However, even with these regulatory measures in place, adverse effects to wetlands could occur. These effects usually occur on small wetland areas, and some activities in wetlands may be permissible under the various protective regulations. Such activities include wetland fill, vegetation removal, and alteration of wetland hydrology. In some instances,

compensatory may be required under the regulations; in other cases, no mitigation is required. Thus, the potential for adverse effects to wetlands is generally associated with land use, especially in cases involving land-disturbing activities.

In general, wetlands are best protected in lands allocated to Zone 3 and Zone 4. In some cases, such activities would enhance wetlands or wetland functions. Development activities occurring on lands allocated to Zone 5 and Zone 6 could potentially adversely affect wetlands. The degree of the potential wetland effect would depend on the amount of site disturbance associated with the proposed recreation or commercial/industrial facility, as well as the type, location, and condition of wetlands present on the site. However, these potential impacts are subject to both state and federal law, and they must be avoided and minimized where practicable. Despite regulatory mechanisms for wetland protection, there is the potential for both a temporary loss of wetland function as well as a cumulative, incremental loss of wetlands associated with small-scale wetland loss and alteration.

Alternative A - No Action Alternative; Under the No Action Alternative, TVA would continue to use the 1988 Plan to guide decision-making regarding land use on TVA public land surrounding Watts Bar Reservoir. Land use requests within those parcels containing wetlands and allocated under the 1988 plan for wetland wildlife management, waterfowl management, and habitat protection areas would be evaluated to ensure the request would protect the integrity of wetland resources. In areas where residential shoreline is allocated to Shoreline Access (Zone 7), potential impacts to wetlands would be regulated under state and federal law. In the event that site-specific wetland impacts appear likely, mitigation requirements could be required to offset any long-term loss of wetland functions. However, there could be some short-term loss of wetland functions during the time required for the mitigated wetland to mature. On parcels designated as Zone 7 (Shoreline Access), there may also be some incremental clearing of wetland vegetation by landowners. This could result in some minor, cumulative loss of wetland function. These functions include loss of shoreline stabilization capability, loss of ability to provide wildlife habitat, and loss of plant community diversity. Although some direct adverse effects to wetland resources and functions could occur under Alternative A, these are expected to be minor and insignificant. Similarly, some long-term, cumulative effects are also possible, but these are also likely to be insignificant.

Alternative B – Balanced Development and Recreation; Under this alternative, a greater percentage of land would be allocated to economic development. Thus, for reasons stated above, there would be a slightly higher potential for adverse wetland effects under this alternative as compared to Alternative A. Particularly, there is a potential for wetland impacts in situations where parcels are reallocated from Zone 2, Zone 3 or Zone 4 to either Zone 5 or Zone 6. Under this alternative, three parcels (Parcels 44, 80, 296) would change from a Zone 4 allocation to a Zone 6 allocation. Parcel 120 would be reallocated from Zone 2 to Zone 6, and Parcel 295 would change allocation from Zone 4 to Zone 5.

Based on SMI data, NWI maps, and information from the 1988 Watts Bar plan, Parcels 44, 80, and 296 contain no significant areas of wetlands. Likewise, Parcel 120 does not contain any known significant areas of wetlands.

Any land use requests involving any of the parcels that would be reallocated (i.e., Parcels 44, 80, 296, 120, and 295) would be subjected to an environmental review. As a part of that review, a field survey would be performed to determine the presence of any onsite wetlands, as well as other sensitive biological or cultural resources. Any land use requests

for parcels containing wetlands would be evaluated to ensure the proposed request would protect the integrity of wetland resources.

Under this alternative, the allocation of the remaining 27 parcels would not change. Thus, potential effects to any wetlands on these parcels would be similar to those mentioned under Alternative A. Because there would be no change in acreage designated as Zone 7, potential cumulative effects to wetlands on these 7 properties would be the same as those anticipated under Alternative A. Although there is a potential for adverse effects to wetlands, significant wetland impacts are unlikely due to regulatory protection and required mitigation when effects are likely. Thus, potential direct, indirect and cumulative effects to wetlands under Alternative B are expected to be minor and insignificant.

Alternative C – Balanced Conservation and Recreation; Under Alternative C, 25 of the 32 parcels subject to reallocation would be allocated to Zone 3, Zone 4, and Zone 6. Eleven of these parcels would change from a Zone 5 or 6 allocation to a Zone 4. This change would afford greater protection to wetlands in these parcels, as no recreation or mixed-use land use proposals would be allowed for these parcels. Existing wetlands on these parcels would be protected according to Zone 4 criteria.

Land use requests on parcels that are not subject to change in allocation (i.e., those remaining in Zone 2, 5, 6, or 7) would be evaluated to ensure the proposed request would protect the integrity of any onsite wetland resources. In all cases, wetland surveys would be performed to determine and verify the presence of wetlands on the subject parcels as part of the environmental review for the particular land use request. As is the case under the other alternatives, wetlands present within any of the allocation zones are subject to state and federal law, and significant wetland impacts are regulated under these programs. In site-specific cases where some wetland impacts could occur, required mitigation requirements would offset any long-term loss of wetland functions. However, there could be some short-term loss of wetland functions during the time required for the mitigated wetland to mature. Some incremental clearing of wetland vegetation by landowners could occur on parcels designated as Zone 7. Such activities may result in some minor, cumulative loss of wetland function, as described above. However, potential effects to wetlands resulting from the adoption of Alternative C are expected to be minor and insignificant.

The resource management plans outlined in the IRM Plan for Watts Bar would tend to protect and enhance wetlands on the selected parcels. As listed in the IRM Plan (see Appendix B), Parcels 281, 268, 233, 188, 187, and 166 are proposed for exotic/invasive plant removal. Removal of exotic plants such as Chinese privet in wetlands on these tracts would promote wetland function by increasing plant community diversity. In particular, native wetland vegetation, which may have been crowded out by invasive plants, may be able to re-establish once the invasive species are removed. Rare plant surveys are proposed for parcels 103, 160, 183, 185, 188, 268, 166, 169, and 281. These same parcels are also targeted for assessment using the TVA Rapid Assessment Method (TVA RAM). This assessment will utilize an EPA-approved method to assess wetland condition. Application of the rare plant surveys and TVA RAM evaluations would allow future management activities to be designed to protect wetland resources specific to these individual parcels. The potential cumulative effect would be beneficial in the form of long-term protection and enhancement of wetland resources on Watts Bar reservoir for these selected parcels. No significant adverse effects to wetland resources are anticipated under the IRM plan.

4.7.2. Floodplains

Alternative A – No Action Alternative; Under Alternative A, the development, and/or management of properties would proceed under the 1988 Plan, and evaluations would be done individually to ensure compliance with Executive Order 11988. Potential development would generally consist of water-use facilities and other repetitive actions in the floodplain that would result in minor floodplain impacts.

Alternative B – Balanced Development and Recreation; Under Alternative B, the potential adverse impacts to natural and beneficial floodplain values would be somewhat greater than those expected under Alternative A, because more parcels of the available land would be allocated for economic development.

Alternative C – Balanced Conservation and Recreation; The potential adverse impacts to natural and beneficial floodplain values under Alternative C would be less than those under Alternatives A or B because a substantial portion of the available land would be allocated for resource management and conservation activities.

Use of the IRM Plan under Alternatives B and C would result in the least potential adverse impacts to natural and beneficial floodplain values. According to the IRM Plan (see Appendix B), TVA would manage the lands for an optimum level of multiple uses that protect and enhance these values while minimizing potential conflicts. Because more land would be managed using IRM under Alternative C than Alternative B, there would likewise be lesser impacts under Alternative C than Alternative B. However, under all alternatives, potential impacts to floodplain values would be insignificant.

4.8. Land Use and Prime Farmland

4.8.1. Land Use

TVA manages public land on Watts Bar Reservoir to protect and enhance natural resources, generate prosperity, and improve the quality of life in the Tennessee Valley. TVA public land is used for public and commercial recreation, economic development, natural resource management, and a variety of other community needs, often with adjoining or nearby private lands. Consequently TVA is aware of six relatively large developments on Watts Bar Reservoir (see Table 4.8-1) which could require TVA's approval for section 26a or land use. In addition to these potential developments, TVA anticipates that two additional private marinas would be proposed at the upper end of Watts Bar. These proposed developments would have an impact on the use of adjoining and nearby TVA lands.

Development would be constant with standards required by the SMP. These standards minimize the environmental impacts of residential development (TVA, 1998a) such as water quality, aquatic ecology, aesthetics, and other impacts.

On Watts Bar Reservoir several large tracts of land long allocated for industrial and commercial developed have remained undeveloped. Over the course of several decades, these areas have become quality terrestrial habitat for native wildlife. Consequently they have become important sources of informal recreation, such as hunting, wildlife

Table 4.8-1 Proposed or Planned developments on Watts Bar Reservoir.

Name	Location	Development Proposed	Size
The Docks at Caney Creek - Roane County	TRM 561.5 R, adjacent to TVA shoreline access land and TVA tract 207 (Project Operations)	200 homes total, 42 of which adjoin TVA property	94 acres
Emerald Pointe - Roane County	TRM 560.6 R, adjacent to TVA shoreline access property	53 lots, 44 of which are interior. Community slips for interior lot owners.	58 acres
Grande Vista Bay - Roane County	Just upstream of Thief Neck Island, adjacent to TVA shoreline access property, property that was transferred to TWRA, and TVA tract 213 (Project Operations)	160 lake front lots with plans for multiple community docks for interior lots	1,200 acres
Ladd Landing - Roane County	Clinch River, appr. 2 river miles east of the Kingston Steam Plant, adjacent to TVA shoreline access property; former TVA property transferred to TWRA, and tract 162 (pre-allocated to Natural Resource Conservation)	mixture of single family, multi-family, and light commercial development	800 acres
Rarity Ridge - Roane County	west of the former K-25 site in Oak Ridge, on the south side of Watts Bar Reservoir		2,000 acres previously owned by USDOE
Tennessee National - Loudoun County	Tennessee River in Loudon County, including a parcel of TVA tract 98 in the new plan (Pre-allocated for Developed Recreation.	Requested use of the TVA parcel is for development of a golf cart path.	1,400 acres
		Total Acres	5,552

observation, camping, and trails. Not only has this interim use of these sites become the accepted use of the land locally, but any decision to utilize it for its original purpose may be perceived as a loss of public lands with these resources and to the quality of life in the area.

Under Alternatives B and C, TVA has proposed changes and allocations that are compatible with the local zoning ordinances of the cities of Harriman, Kingston, Loudon, and Spring City on properties that adjoin TVA public land and are within respective city limits. Proposed new development would result in changes to the original land plan. Both alternatives would include an additional unplanned 6,000 acres not included in the 1988 Plan. The acreage of land use change resulting under each alternative is listed in Table 2.2-1. Parcels that would result in land use changes under Alternatives B and C are listed in Table 2.1-3. Under these two alternatives, Mixed-use development has been introduced in the Land Use definition of Zone 5, Economic Development. Parcels of land allocated to Zone 5, could be used for a variety of uses, to include residential, commercial/light industrial, and recreation (live, work, play) developments. These parcels would not have water access rights.

There are over 26.3 million acres of land in the State of Tennessee. Only 976,014 acres or 3.7 percent of the land base is in public ownership (Tennessee State Recreation Plan, 2003-2008). TVA owns approximately 165,440 acres (0.6 percent) of the land in Tennessee which is 17 percent of the public lands in the state. From 1992 to 1997, the state of Tennessee ranked 14th in the percentage of agricultural land converted to developed uses with 212,500 acres or two percent of agricultural land being converted to developed, for an average annual rate 42,500 acres. Additionally, 405,100 acres of rural land was converted to developed uses, with an average annual rate of 81,020 acres (National Resources Inventory, Tennessee Statistics Sheet). Over the last 15 years in the Watts Bar Area, except for Meigs County, acreage in county farms has increased by an average of about 8 percent (see section 4.13 Socioeconomics). However, in Meigs County, the acreage in county farms has decreased by 11 percent or 6,031 acres. Information in the socioeconomics section indicates that the counties surrounding the Watts Bar Reservoir have grown faster in the past ten years than in either the state or the nation with projections that this faster growth is likely to continue for the next several years.

Alternative A – No Action; Under Alternative A, the current 19 allocation categories would be used to manage future land use decisions. All land use requests would be evaluated for consistency with the 1988 Plan. All land use requests would be denied or approved by environmental reviews and other administrative actions if requests are compatible with the Watts Bar Lands Plan. TVA Board approval would be required for all uses that are incompatible with the plan.

Under Alternative A, there would be minor changes to current land use. Land currently allocated for economic development (1,471 acres) would eventually be developed.

Alternative B – Balanced Development and Recreation; Under Alternative B, commercial recreation and economic development would be promoted by allocating 9 out of 32 parcels of TVA public land to Zones 5, and 6. When compared to the No Action Alternative, this would result in an additional 807 acres being allocated for economic development, which would increase the total acreage in Zone 5 from 1,471 acres to 2,278 acres. Therefore, the number of land use agreements for industrial use such as industrial parks and barge terminals could increase in the future. Most importantly though, the new definition of Zone 5, which now includes mixed use development, would allow parcels larger than 500 acres to be considered for mixed-use development in the future. Under this alternative, natural resource conservation (Zone 4) would decrease from 3,299 acres to 3,002 acres (297 acres less) and developed recreation (Zone 6) would decrease from 1,973 acres to 1,475 acres (498 acres less), however, under the new definition a Zone 5 allocation could include developed recreation opportunities.

Under Alternative B, there would be moderate changes to current land use, by the allocation of 795 acres (5 percent) of natural resource conservation or developed recreation lands to economic development. From Alternative A to Alternative B, lands available for economic development would increase from nine to 14 percent (2,278 acres), therefore, Alternative B would have the most potential impact. This could encourage more of the adjoining land to be developed and possibly even in combination with the TVA public land.

Alternative C – Balanced Conservation and Recreation; Under Alternative C, the conservation of natural resources and informal recreation would be promoted by allocating 12 out of 32 parcels of public land to Zones 4, and 6. When compared with the No Action Alternative, these allocation differences from Alternative A would result in an additional

1,989 acres to be included Zone 4 for natural resource conservation. As a result, the total acreage allocated in Zone 4 would increase from 3,299 acres to 5,288 acres. Changes under Alternative C would result in a decrease in total acreage of economic development and developed recreation. The total acreage currently allocated for Zone 5 would decrease from 1,471 acres to 52 acres. As a result, 99 percent of the total acreage previously allocated to economic development in the 1988 plan would be allocated to Zone 4, Natural Resource Conservation. This could result in a decrease in the amount of future industrial land use agreements and potential for mixed use development opportunities. The total percentages allocated for developed recreation (Zone 6) would also decrease from 1,973 acres to 1,415 acres. Impacts to natural resources and recreation are further discussed in Sections 4.2 and 4.11.

Natural, cultural, recreational, and visual resources would be managed and addressed under the IRM (Integrated Resource Management) Plan. The IRM Plan strives to balance the conservation and management of each resource and the competing interests of stakeholders and addresses Zones 2, 3, 4, and 6 under the Watts Bar Lands Plan. The scheduled activities and work plans would be reviewed annually to evaluate priorities and adjust activities to meet resource goals and stakeholder needs. As a result of the implementation of IRM Plan activities proposed, all four resource areas would benefit. IRM Plan activities include vegetation management, trails, parking lots, wildlife plots, and forestry partnerships. Because IRM plan activities would seek to exceed regulatory requirements and applicable guidelines while enhancing and protecting all resource areas, no impacts to land use would be anticipated as a result.

Cumulative impacts to regional resources are ongoing and likely to continue in the Watts Bar Reservoir area, regardless of any action taken by TVA or the Alternative selected. This is due to the amount of private land that borders TVA retained properties, 17,000 acres of which are platted for residential subdivisions. It is estimated that about one half of those 17,000 acres (8,500 acres) are all already developed and are developing at an increasingly rapid pace, throughout the Watts Bar Reservoir area. As stated earlier, TVA is aware of approximately 5,552 acres of privately-owned land that is proposed for development in the near future (see Table 4.8-1).

Alternative B has the most potential for cumulative impacts on the regional land use. Under this action alternative TVA would allocate approximately 14 percent (2,278 acres) of the current public land base on Watts Bar Reservoir to Zone 5 for Economic Development which now includes a “mixed-use” residential component. This could encourage more of the adjoining land to be developed and possibly even in combination with the TVA public land. The former Clinch River Breeder Site proposed for Zone 5 is located in Roane County, cumulatively allowing even more waterfront development to occur in the county. In Rhea County, the proposed allocation for Parcels 297, 298, and 299 is Zone 5, which would include mixed use development opportunities. In Meigs County, the proposed allocation for Parcel 5 is also Zone 5. Overall, this would reduce the balance of public land in the state of Tennessee by 0.01 percent. However, in the regional area of Watts Bar, it would reduce the public lands 14 Percent.

Alternative C would not allocate any additional TVA public lands for development purposes. In fact, under Alternative C, 12 percent more lands would be placed in Natural Resources Conservation management than under the No Action Alternative. TWRA has requested acreage corresponding to Parcels 297, 298, and 299 to be managed as a WMA, which would be in line with the State Recreation Plan to acquire more public recreation land for

future generations. Therefore, Alternative C would not add any incremental impacts to the availability of public lands in the state of Tennessee or the Watts Bar region.

4.8.2. Prime Farmland

Potential effects to prime farmlands can occur when actual or designated land uses are changed to other uses or designations, such as commercial or residential development, that preclude the property being used for agricultural purposes. Generally, those properties located in Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) are not subject to impacts to prime farmland, as they would be retained in a relatively 'natural' state and would not be converted to other land uses. However, parcels allocated to Zones 5, 6, or 7 are subject to potential effects to prime farmland because farmland in these zones could be devoted to other, non-agricultural uses such as commercial development and developed recreation.

Under any of the alternatives, any proposed actions involving the transfer of more than 10 acres of land for development which contain any acreage of soil with prime farmland properties would require completion of Form AD 1006, *Farmland Conversion Impact Rating*. This impact rating is based on soil characteristics as well as site assessment criteria such as agriculture and urban infrastructure, support services, farm size, compatibility factors, on-farm investments, and potential farm production loss to the local community and county. Site assessment scores tend to be higher for the more rural locations. Sites receiving scores greater than 160 points (out of possible 260) are given greater consideration of protection so that agricultural use can be preserved.

Alternative A - No Action Alternative; Potential direct impacts on acreage of prime farmland are shown in Table 4.8-2. Under the No Action Alternative, prime farmland could be converted to land uses incompatible with agriculture. There are 1,175 acres of prime farmland allocated to Zones 5, 6, and 7. There would be no prime farmland impacts to those parcels intended for undeveloped recreation and shoreline access. There are 217 acres allocated to Zone 5 for mixed-use development, 289 acres to Zone 6 for recreation, and 678 acres to Zone 7 for shoreline access. A list of these parcels can be found in Section 3, Tables 3.8-11 to 3.8-13.

Table 4.8-2. Prime Farmland Acreage Potentially Affected under Each Alternative

Zone	Alternative A	Alternative B	Alternative C	Difference (A - B)	Difference (A - C)
2	499	499	499	0	0
3	702	702	702	0	0
4	715	661	934	-54	219
5	217	299	38	82	-179
6	289	261	249	-28	-40
7	678	678	678	0	0
Totals	**3100**	**3100**	**3100**	**0**	**0**

The largest acreage of prime farmland in Zone 5 allocations occurs on Parcels 145, 297, 142, and 174 in decreasing order (see Table 3.8-11). Parcel 145 contains 107 acres of prime farmland soils, and 56 acres are used for agriculture. Of the parcels allocated for potential development, this individual parcel would be subject to the greatest impacts with respect to prime farmland. Thirty-four acres of Parcel 297 are classified as prime farmland,

and 7 acres are classified as agricultural land use. Parcel 142 has 25 acres of land with prime farmland properties, but only 5 acres are now used for agriculture. Parcels 142 and 145 are located in the former Clinch River Breeder Site and Parcel 297 is located in the Watts Bar Dam vicinity adjacent to State Highway 68. Parcel 174, located near Harriman, Tennessee, contains 20 acres of prime farmland.

The City of Oak Ridge has requested transfer of the former Clinch River Breeder site (Parcels 142, 143, 144, 145, 146, 147, and 148) for development. The proposed transfer of these 1,223 acres would affect 187 acres of prime farmland soils and 65 acres of land used for agriculture. The City of Rockwood has requested Parcel 218 for mixed-use development. This 61.4-acre peninsula has 26.6 acres licensed for agriculture and contains 4 acres of prime farmland (see Table 3.8-14). Parcel 218 is the only Zone 5 parcel with an existing agriculture license. A farmland rating (i.e., completion of Form AD 1006) would be required prior to transferring any of these Zone 5 parcels for development.

Soil disturbance associated with developed recreation, such as construction of parking lots, buildings, etc., would affect prime farmland soils. Those parcels allocated for recreation (i.e., allocated to Zone 6) that contain the most prime farmland are Parcels 201, 5, and 68 (see Table 3.8-12). Parcel 201, which is partially adjacent to the Roane County Park, contains 25 acres of prime farmland. Parcel 5, Meigs County Park, has 22 acres of prime farmland, and Parcel 68, which is adjacent to the Southwest Point Golf Course, contains 20 acres of prime farmland. The only existing agriculture license within Zone 6 is on Parcel 219, which is located near the city of Rockwood on 69 acres. It has 19 acres of prime farmland; 14 acres are used for agriculture, and 0.2 acres are under agriculture license. Any development on these parcels would require a farmland rating.

The retained strips of TVA land along the waterfront are allocated to Shoreline Access (Zone 7) (see Table 3.8-13). Parcel 212 covers 76 acres, and extends along portions of the shoreline from Bullet Branch past Pinnoak Pointe and Lock Haven Estates, past Johnson Bend to McDaniel Hollow. This stretch of land contains 26 acres of prime farmland soils, and 24 acres are classified as agricultural land use. Parcel 265, which borders Estes Woods Estate, has 43 acres of prime farmland on 51 total acres. Ten acres are used for agriculture. If earth-moving activities occur on any parcels larger than 10 acres, there would be potential impacts to prime farmland, and a farmland rating would be required.

Alternative B - Balanced Economic Development and Recreation; Under Alternative B, 82 acres of prime farmland would be reallocated to Zone 5 for mixed-use development (see Table 4.8-2). The most significant is Parcel 296 which is currently allocated to Zone 4, with 46 acres of prime farmland and 90.2 acres licensed for agriculture. Parcels that would be reallocated from Zone 6 to Zone 5 are Parcel 5 and Parcel 299. They contain 40 acres of prime farmland soils. Implementation of Alternative B would have greater potential impacts to prime farmland than would Alternative A. All of these parcels would require a farmland rating prior to any land transfer. Parcels 296 and 299 are located within one mile of Watts Bar Fossil and Nuclear Plants and are adjacent to State Highway 68. Parcel 5 is adjacent to the Meigs County Park and is within one mile of Watts Bar Dam. Because of the nearness of these parcels to urban infrastructure, a farmland rating below the160 threshold is expected. Thus, farmland within these parcels is unlikely to meet the criteria for protection.

This alternative involves 217 acres of prime farmland currently allocated for development (i.e., within Zone 5) for a total of 299 acres (see Table 4.8-2). Development of this acreage

would have negative effects to prime farmland because the post-development land use would not be compatible with agriculture. However, these impacts are expected to be insignificant because this acreage comprises only about 0.2 percent of the total prime farmland in the four-counties, i.e., 125,964 acres (see Table 3.8-4). A farmland conversion impact rating would be required before development could occur.

Alternative C - Balanced Conservation and Recreation; Under Alternative C, 179 acres of prime farmland previously allocated to Zone 5 would be allocated to Zone 4, and 40 acres of prime farmlands would be reallocated from Zone 6 to Zone 4 (see Table 4.8-2). Placing these parcels into Natural Resource Conservation would protect the farmland, and potential effects would be beneficial. The remaining parcels allocated for development are 140, 170, 174, 181, and 191 (see Table 3.8-11). Parcel 140 (8 acres), located across the river from the former Clinch River Breeder site, is 100 percent prime farmland. Parcels 170 and 174 are located near Harriman. All of Parcel 170 (6 acres) is prime farmland. Twenty acres of the total 22 acres of Parcel 174 have prime farmland properties. Parcels 181 and 191 each have 1 acre of prime farmland and occupy 8 and 4 acres, respectively. If these remaining parcels are transferred individually, only Parcel 174 would require a farmland rating because 140 and 170 occupy less than 10 acres. A farmland rating below 160 is expected for Parcel 174 because of its urban location. Overall, implementation of this alternative would have beneficial effects on prime farmland in the project area.

Potential impacts to farmland associated with implementation of the IRM Plan are related to licensing, converting fescue pasture to native vegetation, and shoreline stabilization. Most of the prime farmland soils lie along the shoreline. Reducing the potential for soil erosion by stabilizing the shoreline would be a beneficial effect. Farmlands would benefit from continued licensing of selected TVA lands for agriculture use. No impacts are expected from changing the land cover from fescue to native grasses, as this would benefit wildlife habitat. Generally, implementation of the IRM Plan approach would be beneficial to farmland.

Comparison of Alternatives - Implementation of Alternative C would have the least potential to negatively affect prime farmland; implementation of Alternative B would have the most. Under Alternative A, 217 acres of prime farmland are allocated for development (see Table 4.8-2). Converting this land would have negative impacts due to land use changes which are incompatible with agriculture. An additional 82 acres of prime farmland would be allocated for development under Alternative B. This additional acreage is located close to urban areas. Under Alternative C, an additional 219 acres of prime farmland would be allocated to Zone 4, which would protect the farmland. Under Alternative C, only 38 acres of Zone 5 properties containing prime farmlands would be subject to development.

Adoption of Alternative B would have the most potential to negatively affect prime farmland. However, only about 0.2 percent of the total prime farmland in the 4 counties would be affected. Even though completion of Form AD 1006 is required before development under any of the alternatives, ratings below the 160 threshold are expected. Because of the small percentage of prime farmland affected and the close proximity of the majority of the Zone 5 parcels to urban infrastructure, anticipated impacts to prime farmlands from development would be insignificant.

Development of TVA land surrounding Watts Bar Reservoir is not likely to produce any significant indirect impacts to farmland. Only about 16 percent of land within one mile of the reservoir is currently used for agriculture (see Table 3.8-5). On a county-wide basis, the

percentage of agricultural land in the four county area ranges from 26.1 to 54.6 percent (see Table 3.8-4). The current trend indicates that farm size is increasing in all counties except Meigs (see Table 3.8-3). Land in all four counties with properties to be classified as prime farmland totals 125,964 acres (Table 3.8-4). Prime farmland soils within the project area total 3,115 acres, and a maximum of 1,248 acres is subject to development (see Table 4.8-2). This is about 1 percent of the combined acreage in the four counties. Thus, indirect impacts to farmland are not expected to be significant.

4.9. Cultural Resources

Cultural resources, including archaeological resources and historic properties are protected by the National Historic Preservation Act (NHPA). Archaeological resources are afforded additional protection under the Archaeological Resources Protection Act. Similarly, the Native American Graves Protection and Repatriation Act (NAGPRA) afford protection to Native American resources, particularly human remains.

Regardless of the alternative selected, in accordance with Section 106 of NHPA, any activity that could affect historic properties requires surveys pursuant to 36 CFR Part 800. In the event that adverse effects are likely to result from a proposed project (e.g., a land use request), appropriate mitigation would be required by TVA as a condition of approval.

Under any alternative, TVA will conduct a phased identification and evaluation procedures as set forth in 36 CFR Part 800.4(b)(2), regulations of the Advisory Council on Historic Preservation implementing Section 106 of NHPA, in order to identify, evaluate, and assess potential effects on historic properties.

Under the IRM Plan, proposed actions that could possibly affect cultural resources would typically be resource management activities initiated by TVA. Because these actions would be planned and coordinated for compliance with various protective regulations, adverse effects to archaeological resources from IRM Plan actions are not likely. However, should potential effects be identified, avoidance or mitigation (see above) would be implemented to ensure that these effects would be insignificant.

Archaeological Resources - Under the IRM Plan, TVA would conduct the following activities for Cultural Resources Management:

- Discuss and develop plans for Interpretive Center/Signage/ and possibly, a trail on Huffine Island.

- Archaeological investigations would be completed prior to initiation of proposed soil-disturbing activities, e.g., installation of additional wildlife openings, timber harvest, road construction, and development of parking areas. Should archaeological resources be identified, appropriate measures, including avoidance and possible mitigation, would be taken to ensure compliance with Section 106 of the NHPA.

Historic Resources - A Memorandum of Agreement (MOA) is being prepared and executed for identification, evaluation, and treatment of historic properties that are eligible for inclusion in the NRHP. This MOA will apply to all TVA land considered within the three alternatives, as well as the IRM. National Register eligibility will be evaluated in consultation with the Tennessee SHPO according to stipulations of the MOA executed with the SHPO. Furthermore, mitigation of adverse effects to any historic property will be

conducted according to the stipulations in the MOA. Thus, because historic resources will be identified prior to actions, and because appropriate mitigation will be applied, implementation of the Integrated Resource Management Plan would not have any adverse impacts on historic resources, including historic structures.

4.9.1. Archeological Resources

Archaeological resources are widespread on the Watts Bar Reservoir properties and have been identified in each of the seven allocation zones. With the exception of Parcel 257, the 32 parcels involved in Alternatives B and C will require additional archaeological investigations to identify and evaluate historic resources. Parcel 257 was systematically investigated in 2000 as part of another undertaking (Ahlman et al., 2000), and no archaeological resources were identified.

Approximately 16 percent of the area involved in this land plan has been subjected to intensive survey. Under any of the alternatives, the land that has not been investigated will require a systematic survey in order to identify and evaluate any archaeological resources that may exist. If a land use proposal has the potential to affect archaeological resources, then TVA, in consultation with the SHPO and other consulting parties, would conduct further evaluations to determine the resources' eligibility for inclusion in the NRHP, and appropriate review under Section 106 of the NHPA would be conducted.

Alternative A – No Action; Under this alternative, site-specific activities proposed in the future would be approved or denied according to the significance of the resource. In cases where archaeological resources would be affected, mitigation may be required. Such mitigation typically calls for additional archaeological investigation and may require data recovery of potentially impacted archaeological resources in the form of removal, cataloging and archiving of these resources. Thus, under Alternative A, archaeological resources could be affected, but adverse effects would be mitigated. Under Alternative A, protection of archaeological resources would be achieved through compliance with NHRP requirements. Because of this compliance and because appropriate mitigation would be performed as necessary, potential effects to cultural resources would be insignificant.

Alternative B – Balanced Development and Recreation; Under Alternative B, Balanced Development and Recreation, TVA would increase the acreage allocated to Zone 5 (Economic Development) by about 807 acres (see Table 2.2-2). Conversely, the acreage dedicated to Zone 4 (Natural Resource Conservation) and Zone 6 (Developed Recreation) would decrease accordingly by about 297 acres and 498 acres, respectively, as compared to Alternative A. The acreage allocated to Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), and Zone 7 (Shoreline Access) would remain the same as under Alternative A.

Because of the likelihood of soil disturbance, resulting from land use requests on Zone 5 parcels pose the greatest potential for affecting archaeological resources. Land use requests, and resultant activities on Zone 6 (Developed Recreation) parcels could also affect archaeological resources for similar reasons, but to a slightly lesser degree. Under Alternative B, approximately 24 percent (by acreage) of the known archaeological resources on the 32 parcels would be placed in preservation or conservation (i.e., allocated to Zone 3 and Zone 4). The remaining 76 percent of the acreage would be allocated for purposes of development and recreation (i.e., 52 percent Zone 5, and 24 percent Zone 6). Thus, there is a potential for effects to archaeological resources under Alternative B.

However, because appropriate mitigation would be implemented under NHRA, potential effects would be insignificant.

Alternative C – Balanced Conservation and Recreation; Under Alternative C, Balanced Conservation and Recreation, TVA would help promote conservation of natural resources and informal recreation by allocating 25 of the 32 subject parcels to Zone 3, Zone 4, and Zone 6. The remaining 7 parcels are committed for TVA project operations, protection of significant resources, or license agreements. Under Alternative C, 96 percent of the known archaeological resources within these 32 parcels would be placed in preservation and conservation (i.e., in Zone 3 and Zone 4). The remaining 4 percent would be allocated to recreation (Zone 6). TVA would be selective in entertaining any land use requests within Zone 3 parcels in order to ensure protection of sensitive resources, including archaeological resources. Similarly, land use requests and proposed resource management actions within Zone 4 parcels would be scrutinized to prevent adverse effects to any sensitive resources present. Thus, adverse effects to archaeological resources are not likely to occur within Zones 3 or 4, and the potential for such effects would be less under Alternative C than the other two alternatives. Because any potential adverse effects to archaeological resources would require appropriate mitigation, any such effects would be insignificant.

4.9.2. Historic Structures

The historic structures data used for this study was derived primarily from the survey done for the 1988 Watts Bar Lands Plan. For any proposal on a given parcel (regardless of zone allocation), a field check of the current status of these historic resources would be accomplished to determine the significance of the resource. Under each alternative, review for applicability of the NHPA would take place for any proposed activity that has the potential to affect historic resources identified on or adjacent to TVA public land. Nearly all these historic resources are located on property adjacent to TVA land, not on TVA tracts. Historic properties, especially historic structures, located offsite would be considered because they may be subject to indirect affected effects such as changes in the visual character or setting from actions on TVA property.

Regardless of the alternative, proposed site-specific activities would be subjected to review in accordance with Section 106 of the NHPA to determine what historic features exist on TVA public land and on adjacent lands within the Area of Potential Effect (APE). Also, the significance of any historic structures present and the degree of potential impact of the action on historic resources would be determined under each of the alternatives.

Alternative A – No Action Alternative; Because they could change the visual character of the surrounding area, activities on Zone 6 (Recreation) parcels, particularly those developed for commercial recreation, have the potential to impact adjacent historic structures. This situation applies to Parcels 9, 10, 121, 230, and 5. Likewise, development activities on parcels allocated to Zone 5 (e.g., Parcels 142 and 145) also would have the potential to visually impact adjacent historic structures. Actions on Parcels 120 and 122, which are allocated to Zone 2 (Project Operations), also could visually affect adjacent historic structures.

Thus, potential effects, especially indirect, visual effects, are possible under Alternative A. However, because these potential effects would be identified, along with possible mitigation measures, and because TVA would reserve the option to refuse land use request that would have unavoidable adverse effects, potential effects to historic structures would be insignificant.

Action Alternative B – Balanced Development and Recreation; Activities within parcels allocated to Zone 6 (Developed Recreation), especially those tracts developed for commercial recreation, have the potential to indirectly impact adjacent historic structures. Thus, recreational developments on Parcels 9, 10, 44, 120, 121, and 230 have the potential to affect nearby historic structures. Likewise, industrial or commercial development on parcels Zone 5 (i.e., Parcels 142, 145, and 5) has the potential to indirectly impact adjacent historic structures. Activities on Parcel 122, which is allocated Zone 2 (Project Operations) also have the potential to affect adjacent historic structures. However, because potential effects to historic structures would be identified and mitigated appropriately as necessary, these effects would not be significant.

Action Alternative C – Balanced Conservation and Recreation; Developed recreation could indirectly affect historic structures, depending upon the visual characteristics of the proposed development and visibility of the development from the potentially affected structure. In particular, recreational development on Parcels 120, 121, and 230 would have the potential to visually affect historic structures on adjacent, non-TVA, properties. As is the case with Alternative B, project operations on Parcel 122 could potentially affect historic structures. However, for the reasons stated above, potential effects to historic structures are expected to be insignificant.

Overall, adoption of Alternative B would have a greater potential to affect historic properties than C. Under Alternative B, there would be more tracts and more acreage available for development. In general, this development would have the potential to affect historic properties, primarily indirectly. Under Alternative C, more acreage would be allocated for Natural Resource Conservation. Because of the types of activities expected within this zone, the potential for adverse effects to historic structures is low.

4.10. Navigation

Potential effects to commercial navigation as a result of a new Land Management Plan for Watts Bar Reservoir include the disruption or loss of barge terminal activities on TVA lands that are leased or licensed to a private entity, and the possible loss of safety harbors and landings. Navigation signs, lights, and day-boards on shoreline tracts are considered permanent features and are protected by the TVA Act (Section 26a regulatory process). Specifically, shoreline construction regulations stipulate that these aids may not be removed or obstructed. Thus, these navigation aids would remain unaffected by any changes in land management policy.

One of the five active commercial barge terminals on Watts Bar Reservoir is located on a portion of a TVA tract under license to a private firm. A land use designation change has been requested by the City of Rockwood for this tract (Parcel 218), which is currently designated Zone 5 Economic Development). Rockwood has requested the change to allow for the development of commercial recreation facilities on that tract at some time in the future.

Commercial navigation is expected to remain at a fairly constant level of 800,000 to 1,000,000 tons per year on Watts Bar Reservoir under any of the alternatives. This level would likely fluctuate some depending on the overall health of the nation's economy, fluctuations in transportation costs, and the weather (the volume of road salt delivered to upper East Tennessee terminals is dependent on the previous winter's depletion of supply and predictions of the coming winter's severity). Navigation traffic would likely increase if

new waterway-using industries locate on Watts Bar Reservoir or upstream on Melton Hill, Fort Loudoun, or Tellico reservoirs.

A larger replacement lock downstream at Chickamauga Dam is being constructed, and is scheduled to be completed in 2011. The existing lock can only handle one barge at a time. However, the replacement lock will allow nine barges to be locked through at one time, which will greatly reduce travel times and transportation costs, making upper Tennessee River industrial locations much more attractive to industries. However, any increase in barge traffic as a result of the new lock at Chickamauga would likely be gradual, and may or may not involve new industries and terminals on Watts Bar Reservoir.

Alternative A – No Action; Under the No Action Alternative, there would be no immediate effect to commercial shipping or to any existing terminal. Some parcels that are currently designated Zone 5 for possible commercial or industrial development were designated as such because they possess deep water access along the shoreline suitable for a barge terminal. Such sites are Parcel 174 in Harriman, Parcel 140 on the Clinch River opposite the former Breeder Reactor Site, and Parcel 298 on the Watts Bar Dam Reservation. Should any or all of these sites ultimately be developed by commercial waterway-using industries, growth in commercial shipping that originates or terminates on Watts Bar reservoir would likely occur. The degree of actual effect is unknown at this time, but such development would be subjected to an environmental review specific to that development.

Alternative B – Balanced Development and Recreation; Under Alternative B, an additional 800 acres would be available for commercial and industrial development. None of these additional tracts are suitable for barge terminal development. Thus, the potential effect on commercial navigation would be the same as under Alternative A, with the potential exception of the disposition of Parcel 218.

Under Alternative B, Parcel 218 would change designations from Zone 5 (Economic Development) to Zone 6 (Developed Recreation). The business operating the terminal on Parcel 218 has a license with TVA for an 11-acre section of the 61-acre tract. Whether or not the license agreement would be maintained in the event of a land use designation change is uncertain. If the license is revoked by either party, the loss of terminal operations on Parcel 218 would directly affect the local and regional economy. During the period from 1997 to 2003, the average transportation savings enjoyed by this company and its business partners as a result of using barge transportation was approximately 500,000 dollars per year. Additionally, some of the firm's employees are engaged in terminal operations.

Shifting to an alternative transportation mode could be difficult for this business. Although the business is located on a main north-south rail route, the railroad is often unwilling or unable to provide local service on main lines because of the interruption of long-haul service. Therefore, if barge transportation were to become unavailable to this enterprise, the likely transportation alternative would be to truck the product either directly to market or, more likely, to an alternative barge loading facility in either Knoxville or Chattanooga. This transportation option would result in an additional 1,000 to 5,000 trucks on area roads annually, particularly U.S. Highway 27. According to the Tennessee Department of Transportation, the Average Annual Daily Traffic (AADT) count on Highway 27 in Rockwood (where U.S. Highway 70 shares the roadway with U.S. Highway 27) ranges from 8,610 in the southernmost stretch to 18.800 near the interstate (TDOT, 2005). South of the U.S. 70W – U.S. 27S split, the AADT drops to 6,540.

Alternative C – Balanced Conservation and Recreation; Under Alternative C, about 1,400 acres of TVA land that is currently designated Zone 5 (Industrial and Commercial Development) would be re-designated to Zone 4, Natural Resource Conservation. This acreage would, therefore, no longer be available for any kind of commercial development. Two tracts suitable for commercial navigation would be impacted. One is Parcel 218 (see discussion above), and the other is Parcel 298, which contains 34 acres suitable for barge terminal development at the Watts Bar Dam Reservation. The potential economic impacts of the loss of terminal operations on Tract 218 were discussed previously. The potential effect of reallocating Parcel 298 is difficult to quantify. Although Parcel 298 has the potential for development as an industrial site with barge terminal, it has not been developed to date and is currently used for casual recreation. Some generalizations can be made about the possible outcome should this tract be fully developed; both light and heavy industries that utilize the waterway typically have a skilled workforce, higher than average pay, and a high level of local investment. Examples include Tate & Lyle's A.E. Staley plant in Loudon and the Olin Corporation plant on the Hiwassee River.

From the commercial navigation perspective, adoption of Alternative A (No-Action Alternative) would result in the fewest negative impacts. No existing terminals would be affected, and the Watts Bar Reservoir area private and public entities would have the most flexibility in future industrial development options. Under Alternative B (Balanced Development and Recreation), an existing terminal may have to cease operations. This would potentially impact employment and traffic in Rockwood. Adoption of Alternative C (Balanced Conservation and Recreation), in addition to possibly eliminating an existing terminal, would potentially remove a good industry with barge terminal site from the range of economic development options currently available.

4.10.1. Recreational Navigation

Recreational boat traffic on Watts Bar Reservoir is expected to increase under any of the alternatives. This is due to several factors. There are several high quality boat manufacturers in East Tennessee, and the level of interest in boating is high in the area. There is an abundance of recreational facilities on Watts Bar provided by the Tennessee Wildlife Resources Agency (TWRA) and TVA. Watts Bar Reservoir has a number of refueling and boating supply facilities at public marinas. Area lakes, including Watts Bar, generally provide good fishing opportunities. Also, the predictable water levels on Watts Bar Reservoir tend to enhance boating conditions. These factors tend to attract boaters from elsewhere in the state, as well as out-of-state visitors, to the Watts Bar area.

A Land Plan for Watts Bar may affect the growth of recreational boating in several ways. First, the availability of shoreline access for residential development, on which the owners may be able to build a dock for their own boat, directly affects recreational boating. Second, boating opportunities are influenced by the acreage made available for developed recreation, including marinas. Additionally, and perhaps contradictorily, maintaining a natural shoreline may also attract boaters as fish and wildlife habitats are maintained and/or improved. Because the land planning process merely allows for certain kinds of land use, and there are few, if any, specific development plans for the future, prediction of the actual increase in the number of boats utilizing the reservoir in the future is imprecise, although some general conclusions may be drawn.

Although the acreage of land allocated to Zone 7 (Shoreline Access) would remain constant at 2,388 acres under all three alternatives (see Table 2.2-2), there is some variation in the

acres allocated for Developed Recreation (Zone 6). The No-Action Alternative, actually has the most acres allocated for Developed Recreation (1,973 acres or 12 percent of all TVA land on Watts Bar Reservoir), as per the 1988 Watts Bar Land Plan. Under Alternative B, Balanced Development and Recreation, 1,475 acres (i.e., 9 percent of the total property) would be made available for Developed Recreation. However, under Alternative C, 1,415 acres, or 8 percent of total acres would be allocated to Developed Recreation possibilities. Although these acreages are very similar, the number of acres available for commercial recreation development places some limits on the number of additional public marinas and boat rental businesses that may eventually be available on Watts Bar Reservoir. Conversely, the reduction in developable acres and the increase in Natural Resource Conservation acres under Alternative C may actually increase the number of boaters enjoying the scenery and wildlife.

An increase in recreational boating activity on Watts Bar Reservoir makes boating safety an issue of particular concern to both law enforcement agencies and the commercial navigation industry. In the period 1995 to 2002, 61 boating accidents on Watts Bar Reservoir were reported to the U. S. Coast Guard, an average of about 9 incidents per year. The National Boating Safety Council reports that there is typically a 10 to 30 percent under-reporting of accidents to the Coast Guard. Thus, the actual number of incidents is likely to be 10 to 12 per year. Of the 61 reported incidents, 41 involved alcohol, careless or reckless operation, inexperienced driver, operator inattention, or excessive speed. Less than one third of the incidents reported were due to bad weather, equipment/mechanical failure, or hazardous waters. There were no reported incidents of collision with a commercial vessel or barge on Watts Bar reservoir in this time period.

Regardless of the alternative selected, the amount of recreational boating is likely to increase on Watts Bar Reservoir as the desirability of lakefront living and the popularity of the region as a retirement destination increases. The reservoir already affords good accessibility for day users, and there would likely be a demand for additional boat storage in the form of wet and dry slips. Scenic beauty is also an attraction for boaters; therefore, limiting commercial recreation facilities development is not necessarily a means to control the number or type of boaters.

4.11. Recreation

Historically TVA's recreation impact assessments have been based on the amount of recreation use and or recreation use standards per acre. However, in 2003, TVA piloted the Water Recreation Opportunity Spectrum (WROS) (Hass et al., 2004.) on Norris and Watts Bar reservoirs. The WROS evolved from the original Recreation Opportunity Spectrum developed in the late 1970s (Brown et al., 1978). This system is a planning tool that classifies the character of a reservoir, based on several factors.

Research shows that people not only seek to participate in recreation activities, but they also seek specific settings in order to enjoy a given experience and its benefits. In WROS, settings, experience, and benefits are listed as components of a recreation opportunity. Several attributes are used to categorize the reservoir. Physical attributes include degree of development, degree of resource modification, and distance to development on the water. Managerial attributes include the degree of public or commercial access facilities and degree of management presence. Social attributes include the degree of visitor concentration or presence, degree of non-recreational use, and the degree of diverse recreation activities.

Developed recreation is compatible with Zone 5, Economic Development. Because Zone 5 can include a variety of development options, including developed recreation, it is difficult to determine the potential effects on existing developed recreation sites. For the purposes of this analysis, TVA assumes that the potential recreation opportunities would not be resource-oriented (i.e., boating, camping, picnicking, swimming in the reservoir), but would likely include formal, non-resource based activities, such as tennis and golf. This would add to the diversity of recreation opportunities on the developed, urban end of the Recreation Opportunity Spectrum. Under most circumstances, this allocation is not likely to have an adverse impact on developed recreation.

Land proposed for allocation for Developed Recreation under Alternatives A, B, and C is 1,973 acres, 1,476 acres, and 1,415 acres, respectively. In 1988, many of these acres were already developed and were providing recreation opportunities. The Zone 6 designation (Developed Recreation) would be retained for many of these parcels in order to honor existing commitments. Thus, the basic difference between the alternatives, with respect to developed and informal recreation, depends on the allocation of the 32 parcels of land subject to reallocation. Recreation opportunities would be available on parcels allocated to Zones 4, 5, and 6. The acreage and zone comparisons for informal recreation for the 32 parcels are provided in Table 4.11-1 below.

Table 4.11-1 Informal Recreation Acreage by Allocation Zone, by Alternative for the 32 Parcels to be Reallocated

Zone	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)
Zone 4 – Natural Resource Conservation	391.5	115.9	2397.7
Zone 5 – Economic Development	1412.3	2221.2	0
Zone 6 – Developed Recreation	859.7	344.8	288.8

There are developed recreation and resource parcels common to all three alternatives. For example, the recreation areas listed in Table 3.11-2 are common to all three alternatives. There are also common resource lands under all alternatives. Examination of the table reveals that only about 40 acres would be available for additional developed recreation under Alternative C. Likewise, under Alternatives A and B, there would be limited opportunities for growth in informal recreation opportunities. Only 392 and 116 acres, respectively, would be allocated to Zone 4 under these two alternatives.

Alternative A -The No Action Alternative; Under the1988 plan, there is more land allocated for developed recreation than under Alternative B or C (500 to 560 acres respectively). However, developed recreation opportunities, such as golf courses and marinas are included under the new definition of Zone 5 which would be used for Alternative B and it is difficult to determine what future recreation activities may eventually be developed on Zone 5 land qualifying for mixed use. Further Alternative C would have more informal recreation opportunities, such as hunting, fishing, and primitive camping on a greater amount of Zone 4, natural resource conservation, land.

Under Alternative A, parcels 142,143,145, 297, and 298 contain adequate acreage to support informal recreation activities, such as hunting and mountain biking. These parcels are currently allocated for economic development. Because no development has yet occurred, the parcels can maintain their interim use for informal recreation. However, should these parcels be developed in the future, their recreational opportunities would be eliminated, limiting future needs for informal recreation on Watts Bar Reservoir. Likewise, adoption of Alternative A could impact the character of the reservoir at the Breeder site and Lowe's Branch areas, as defined by WROS; and the character of the reservoir at the former Clinch River Breeder Reactor Site and at the area fronting Parcels 297, 298, and 299 would become more developed in character and receive higher levels or recreation use.

Continuation of the current plan could adversely affect the amount of future informal recreation activities on Watts Bar Reservoir. Although, impacts to total recreation use would be insignificant, there would be less diverse recreation opportunities. Consequently, Alternative A would increase the lands available for developed recreation, but reduce or limit the number of informal recreation opportunities.

Action Alternative B - Balanced Development and Recreation; Under Alternative B, the impacts to informal recreation are similar to Alternative A. Under this alternative, about 116 acres (see Table 4.11-1) would be allocated for undeveloped/informal recreation use. Parcels 142, 143, 145, 297, 298, and 299, which are large enough to support such activities, would stay zoned for economic development and developed recreation, thus potentially impacting current, interim informal recreation use. However, until development occurs, these parcels would likely continue to provide interim opportunities for some informal, dispersed recreation.

As stated previously, the amount of developed recreation opportunities in Zone 5 is difficult to determine. On the Clinch River Breeder site, most of the parcels do not change allocation from Alternative A to Alternative B. They stay in Zone 5. However, Zone 5 definition now includes a section for "mixed-use development." Mixed-use can include and, or incorporate developed recreation opportunities, such as golf course, marinas, and trails. Consequently, under both Alternative A and Alternative B, developed recreation opportunities might increase. The same scenario holds true for portions of the Lowe's Branch area.

In terms of undeveloped or informal recreation, adoption of this alternative would greatly reduce the possibility of creating additional informal recreation opportunities, such as horse back riding, hunting, and mountain biking on public lands around Watts Bar. Under this alternative, approximately 300 fewer acres would be allocated to Zone 4 than under Alternative A. This reduction of Zone 4 acreage would reduce the ability to supply recreation opportunities in the Rural Natural and semi-primitive end of the Recreation Opportunity Spectrum.

Adoption of this alternative would adversely impact TVA's ability to provide informal recreation opportunities on Watts Bar Reservoir lands over the long term. By WROS standards, developments at the Clinch River Breeder Reactor Site and Lowe's Branch could impact the character of the reservoir. The overall impact of developed recreation would be contingent upon the level of recreation opportunities provided within future developments.

Action Alternative C - Balanced Conservation and Recreation; Under this alternative, developed recreation lands are reduced from 1,476 acres (12 percent) to 1,415 acres (8 percent). However, under Alternative C, there are 5,288 acres allocated to Zone 4, providing a sharp increase in lands for informal recreation opportunities, particularly at the Clinch River Breeder site and the Lowe's Branch area.

Under this alternative, future developed camping demands might not be met. However, most boating access demands could probably be met through the expansion of existing marinas and by the availability of public boat ramps. Although total recreation opportunities would be increased under this alternative if more acreage were allocated to Zone 6, significant adverse impacts to developed recreation opportunities are unlikely.

Under the IRM plan (see Appendix B), TVA will enrich the recreation opportunities at Watts Bar Reservoir. TVA proposes to reopen Rhea Springs campground on Parcel 266. TVA would also evaluate an expansion of recreation opportunities at Fooshee Pass Campground on Parcel 9, Parcel 240, and the Spring City Park Marina with Parcel 279. TVA would consider converting Parcel 5 from developed public recreation to developed commercial recreation. To add diversity to the recreation experience on Watts Bar lands, TVA will evaluate the feasibility of developing a mountain bike/hiking trail system on parcels 297 and 299. The installation of these proposed recreation opportunities would have beneficial impacts on both developed and informal recreation on Watts Bar Reservoir.

4.12. Visual Resources

Potential visual consequences were examined in terms of the likely visual changes between the existing landscape and the landscape as it might be altered by the proposed actions. The assessment of visual change considered the sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. In this assessment, scenic character is described using a variety of adjectives. Scenic integrity, which relates to degree of intactness or wholeness of the landscape character, is also an important factor. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. Scenic Value Class is determined by combining the levels of scenic attractiveness, scenic integrity, and visibility. Scenic Value Class and the foreground, middleground, and background viewing distances were described previously in Section 3.10.

Alternative A - No Action Alternative; Under Alternative A, TVA would continue to conduct environmental reviews, including evaluation for potential visual impacts, prior to the approval of any proposed development on public land. These reviews may prevent the most serious scenic disruptions or loss of visual resources by requiring mitigation measures to reduce potentially significant visual impacts. However, reliance on case-by-case environmental reviews of proposed actions under the 1988 Plan (Alternative A) would likely result in relatively little preservation of specific visual resources. Under the No Action Alternative, a slow but noticeable decline in scenic resources, aesthetic quality, and visual landscape character are expected, as demands for residential, commercial, and industrial development are likely to continue to increase. This decline in scenic resources would likely reduce scenic class levels for some areas of the reservoir by one level or more (e.g., from excellent to good, or from fair to poor). Areas with low scenic values are often influenced by small changes in visual character. Thus, reductions in scenic class level could be potentially significant for areas of common or minimal scenic quality or for those areas that have very little scenic importance.

Incremental additions of water-use facilities may not be individually significant. However, when viewed together with similar structures over a wide area, they contribute to a cumulative reduction of visual harmony and scenic integrity along the shoreline. Visual shoreline congestion and related adverse contrasts would likely increase. Consequently, a gradual reduction of scenic attractiveness, which would degrade the visual landscape character and the aesthetic sense of place, is likely under the No Action Alternative. Scenic integrity of the predominantly natural shoreline would likely continue to decrease under the No Action Alternative.

Adoption of Alternative A could result in cumulative negative impacts including gradual losses of visual resources, scenic attractiveness, and undeveloped natural areas as well as adverse changes in the aesthetic sense of place. The overall result would be a continuing decrease in the visual quality of the naturally scenic reservoir landscape.

Action Alternatives (Alternatives B and C); Lands having the greatest scenic qualities are often the most desirable for public preservation. Frequently, however, they are also the most sought-after for commercial and residential development. Alternative B calls for the greatest number of acres to be considered for re-allocation for future economic development (i.e., Parcels 5 and 299, containing 249.0 acres and 369.9 acres, respectively). Eventually, these lands would likely be devoted to commercial business, light manufacturing, and general industrial purposes. Under Alternative C, the most distinctive scenic areas on Watts Bar Reservoir would be preserved. Also, Alternative C calls for balancing future development with sufficient areas of unaltered shoreline to retain a natural visual character.

Comparative scenic values of TVA public land were assessed during the development of Alternatives B and C in order to identify areas for scenic protection and visual resource conservation. Those parcels having distinctive visual characteristics such as the islands, rock bluffs, steep, wooded ridges, wetlands, and flowering shallow water areas remained in Sensitive Resource Management (Zone 3). Land that provides valuable protective screening also retained this allocation. Parcels that possess attractive visual resources of less significance were allocated to Natural Resource Conservation (Zone 4). This zone also includes land that provides important scenic buffers. Activities that involve minor visible change, such as recreational hiking, picnicking, bank fishing, and some selective forest management, could take place under both zone allocations. Some development with more visible modifications could take place under the Zone 4 designation as long as the location and appearance were subordinate to maintaining the desired visual characteristics.

The scenic character of major WMAs and wetlands would be preserved under all the alternatives. Many islands around the reservoir would be protected from alteration under all alternatives. This would preserve the scenic accent, attractive contrast, and visual richness they contribute to reservoir vistas. Several areas of the reservoir would benefit under the action alternatives. Major sections of the riverine, upper reservoir would be protected or screened from further development. This would preserve the variety of wooded, river, ridge landforms; linear channel islands with low trees; broad areas of shallow water; flowering plants; and steep, forest-covered mountainside along the banks. The combined contributions of these attractive features would help sustain the scenic landscape character and aesthetically pleasing sense of place.

Under Alternative B, Parcels 295 and 296 (249.4 acres) would be changed from their current Zone 4 allocation (Natural Resource Conservation) to Zone 5 (Economic

Development). Likewise under Alternative B, 54.2 acres (Parcels 44, 47, and 257) would be moved from their current Zone 4 allocation to Zone 6 (Developed Recreation). Under Alternative C, the acreage of Zone 4 lands would increase to 5,288 acres, as opposed to 3,002 under Alternative B and 3,299 under Alternative A. This increase in acreage in Zone 4 would tend to benefit scenic quality. The acreage of Zone 3 lands would remain a constant 3,465 acres under all three alternatives (see Table 2-2).

Potential long-term incremental changes are likely to occur for parcels 80 and 257 under Alternative B. Re-allocating these parcels from Zone 4 to Zone 6 would incrementally change the aesthetic sense of place from relatively harmonious landscapes to more heavily human-altered environments. These changes could include shorelines that are naturally appearing that would be developed for beaches, boat ramps, or marinas. Potential negative aesthetic effects could occur for parcels 295, 296, 299, and 5 under Alternative B. These parcels would be re-allocated from either Zone 4 or Zone 6 to Zone 5. In each scenario, the parcels would be allocated for Economic Development and their eventual land use would likely be commercial business, light manufacturing, and general industry. These incremental changes in the landscape would result in long-term cumulative impacts for Watts Bar Reservoir. However, these impacts would be individually insignificant.

Potentially beneficial visual effects could occur for many parcels under Alternative C as a result of the reallocation of some parcels from Zone 5 (Economic Development) and Developed Recreation (Zone 6) to either Zone 3 or Zone 4. A summary of all potential visual impacts can be found in Appendix C, Table C-7.

Overall, adoption of Alternative B would have a greater adverse impact on the visual landscape character and aesthetic sense of place than Alternative C. However, Alternatives B and C both provide for the protection of scenic resources and preservation of natural areas around the reservoir over time through the use of natural vegetative buffers, particularly on the Old Clinch River Breeder Site (Parcels 144 and 146) and the Lowe Branch area (Parcel 294). Scenic integrity would remain moderate or higher. Consequently, implementation of these action alternatives would provide enhanced protective management for visual resources and would help preserve the scenic landscape character of Watts Bar Reservoir for long-term public enjoyment.

Integrated Resource Management Plan; Under all the Alternatives, the effects the IRM Plan on Watts Bar Reservoir would be beneficial for visual resources. This process would apply an integrated, proactive approach that balances the competing interest of stakeholders, while conserving and enhancing natural, cultural, visual, and recreation resources. For visual resources, this planning process would use TVA's uniform objective methodology (TVA, 2003) for the management of visually sensitive attributes and other aesthetic elements in the landscape. Following the evaluation of visual resources, TVA would ensure that the results of the visual resource management evaluations are clearly communicated to stakeholders. TVA would then manage visual resources in a manner that sustains quality aesthetics in the landscape.

Activities proposed under the IRM Plan typically include road access, illegal dump clean-up and prevention, construction and maintenance of access trails, and to provide parking areas within proximity of desired outdoor and recreational activities. These activities would provide greater access to reservoir opportunities, such as viewing scenery for pleasure from the water or land. Wildlife openings and agriculture leases would create positive visual contrast in the landscape. Controlled burns would enhance regeneration of oaks and

control undesirable hardwoods in pine stands on Fooshee Peninsula, Lowe Branch, and former Clinch River Breeder Reactor Site. These controlled burns would enhance the aesthetic value of naturally-appearing landscapes. Conducting timber harvests in other areas of the reservoir would encourage successional forest cover that would enhance scenic integrity. Minor visual effects would are evident following timber harvest as a result of vegetation removal and an increase in personnel and equipment. However, these impacts are temporary and would diminish as the site re-vegetates.

Natural areas and wetlands management activities as proposed under IRM would preserve and enhance the exceptional natural, scenic, or aesthetic qualities of landscapes that are suitable for low-impact public use. Under the IRM Plan, TVA would monitor and remedy, to the extent practicable, abuses found in these areas and further enhance opportunities for viewing naturally appearing landscapes. Historically, such abuses include illegal dumping, unauthorized ATV use, and other activities not permitted in some areas.

The IRM Plan, Visual Resources Management would address visual concerns on a case-by-case basis. That is, assessments of shoreline buffers and other areas of visual concern to the public would be taken into consideration during the development of management plans. Preservation of aesthetically-pleasing landscapes would be prioritized as forest inventories are conducted and long-established cultural landscape character is identified. In these landscapes, cultural and naturally-appearing elements become images that contribute to high-quality scenery. These images may include man-made features such as historical structures or natural elements such as forested ridgeline. The Implementation of the IRM Plan, as proposed, would be beneficial to visual resources under the No Action Alternative and the two Action Alternatives.

4.13. Socioeconomics

In addition to the No Action Alternative (Alternative A), TVA has developed two action alternatives regarding the use of TVA lands on Watts Bar Reservoir. The first of these, Alternative B (Balanced Development and Recreation), involves additional land being allocated for economic development purposes (i.e., to Zone 5, Economic Development). Under the second, Alternative C (Balanced Conservation and Recreation), more land would be allocated for conservation of natural resources and informal recreation (i.e., to Zone 4, Natural Resource Conservation).

Under all of the alternatives, 7,066 acres, or 51 percent of the total TVA land, is either TVA Project land, Sensitive Resource Management land, or has Shoreline Access rights (see Table 2.2-2). With the exception of Parcel 120, none of the parcels with these classifications would be subjected to a change of allocation. Parcel 120 is currently allocated as Zone 2 (TVA Project Lands) and a portion of this parcel is used for water intake for the City of Kingston. Under Alternatives B and C, the allocation for Parcel 120 would change from Zone 2 to Zone 6 (Developed Recreation).

Alternative A - No Action Alternative; Presently, 1,471 acres of TVA land on the Watts Bar Reservoir are allocated for Economic Development, and another 1,973 acres are allocated for Developed Recreation (see Table 2.2-2). The Developed Recreation allocation is compatible with commercial recreation as well as public recreation, greenways, and water access. About 3,299 acres are classified for Natural Resource Conservation and would be managed for the enhancement of natural resources for human use and appreciation. Appropriate activities in these latter areas include hunting, timber

management to promote forest health, wildlife observation, and camping on undeveloped sites. Under Alternative A, parcels would retain their current allocations. Current classifications would continue to be used, and future land use requests would be evaluated for consistency with the current classifications. This alternative does not involve changes in current allocations for any TVA land. Thus, no new potential socioeconomic effects are anticipated under Alternative A.

Many of the tracts that are or could be allocated for Economic Development (i.e., Zone 5) are small or narrow tracts that might provide reservoir access for terminal operations or water use for industries locating on adjacent backlying properties. Others, in particular, the former Clinch River Breeder Reactor site and the parcels in Rhea County near the Watts Bar Dam, could accommodate relatively large industrial or commercial facilities. Use of these sites for such purposes could potentially have significant positive effects to the economy of the area if firms attracted to the sites would not have located in the area otherwise. Several tracts around Watts Bar Dam could be used for Developed Recreation, including some of those that also could be used for Commercial and Industrial purposes. Use of these sites for Developed Recreation could have significant positive impacts on the area's economy, both directly and by improving the quality of life in the area. Other tracts around the reservoir could also be used for additional recreation facilities, but they offer more limited opportunities due to size and existing facilities. The potential socioeconomic impacts of any specific land use proposals would be evaluated as appropriate during the environmental review process.

Alternative B - Balanced Development and Recreation; Under this alternative, the amount of land available for Economic Development (i.e., the acreage allocated to Zone 5) would increase, and there would be a decrease in the amount available for Developed Recreation (Zone 6) and for Natural Resource Conservation (Zone 4). There would be an increase of about 55 percent in the amount available for Economic Development, increasing this allocation to 2,278 acres. There would be a loss of almost 25 percent in the amount of land for Developed Recreation purposes, to 1,475 acres. Land available for Natural Resource Conservation would decrease by about 9 percent, to 3,002 acres.

These changes under Alternative B would provide the potential for increased income and jobs in the area if firms are attracted to locate at those sites reallocated for Industrial and Commercial Development. The extent of the impact could vary widely, and would depend on the nature of the businesses that are established, which is unknown at this time. However, if TVA land were not available, but incoming businesses found an alternate site in the local area, there would be no net effect on income and jobs.

On the other hand, if developed and informal recreation opportunities are replaced by industrial, commercial or residential development, public use of these areas would likely be excluded. The result is a potential decrease in the attractiveness of and the quality of life in the region, especially if large amounts of land are affected. As discussed in Section 4.10 (Navigation), the decrease in land available for Developed Recreation could negatively affect recreational boating opportunities and related businesses, and could possibly have some negative effects on the local economy.

Most of the potential effects of this alternative would be likely to occur in Rhea and Meigs counties, as all of the additional land that would be allocated for Economic Development is located in these two counties. The result would be a loss to this area of several tracts of land available for Natural Resource Conservation and for Developed Recreation. However,

the availability of additional acreage for Industrial and Commercial Development purposes could lead to increased jobs and income in the Rhea-Meigs area if the subject parcels are used for developments that otherwise would not have located in the area. Conversely, the loss of recreation opportunities and natural resources associated with current land uses could make the local area less attractive, and possibly lower the quality of life in the surrounding area.

In addition to the changes in Rhea and Meigs Counties, Parcel 218 in Roane County would be rezoned from Zone 5 (Economic Development) to Zone 6 (Developed Recreation). This could possibly result in the loss of existing terminal operations at this site. The potential impacts on the local economy and on transportation could be important, as discussed in Section 4.10. However, the development of commercial recreation activities at this site could have a positive influence on the local economy, both directly by providing new jobs and income and indirectly by improving attractiveness of the area and quality of life in the area. Also, several other, generally small, tracts in Roane County would be classified as Developed Recreation, which could also affect the local economy positively.

There is potential for significant positive impacts to the regional economy if one or more of the tracts are used for industrial purposes or for commercial activities, including commercial recreation, if these developments would not otherwise occur in the area. On the other hand, loss of open space and informal recreation opportunities could have significant negative impacts on the area's economy, especially in the longer term, if the region's attractiveness and quality of life are negatively affected. The actual extent of these impacts would depend on the specific proposals.

Alternative C - Balanced Conservation and Recreation; Adoption of this alternative would decrease the amount of land available for Industrial and Commercial Development and for Developed Recreation and would increase the amount available for Natural Resource Conservation (see Table 2.2-2). As a result, only 52 acres would be allocated for Economic Development (i.e., Zone 5). There would be a decrease of about 28 percent in the amount of land for Developed Recreation, to a total of 1,415 acres. Land available for Natural Resource Conservation would increase by about 60 percent, to 5,288 acres.

Selection of this alternative would virtually eliminate development for industrial or commercial activities on TVA lands on Watts Bar Reservoir. This includes the elimination of about 279 acres of land now allocated for Economic Development in Rhea County and about 570 acres currently designated for Developed Recreation in Rhea and Meigs Counties. All of this land would be allocated for Natural Resource Conservation. These changes could preclude some potential economic development in the area if alternate locations are not available in the local area. The result could be loss of potential jobs and income. However, the allocation of this land for Natural Resource Conservation would enhance quality of life and the attractiveness of the area, making it more inviting for other economic opportunities, such as housing on adjoining, private lands. This would result in positive economic effects on the local area and surrounding areas.

In Roane County, all tracts at the former Clinch River Breeder Reactor site currently available for Industrial and Commercial Development (i.e., Parcels 142, 143, 145, 147, and 148) would be allocated to Natural Resource Conservation, as would tract 218 near Rockwood. These changes could preclude some potential developments if suitable alternate sites are not available in the area. This could result in negative impacts on growth in jobs and income in the area. In addition, the allocation change for Parcel 218 could

possibly result in the loss of terminal operations at this site. The potential impacts on the local economy and on transportation could be important, as discussed under Alternative B, above. The remaining land available for Developed Recreation could produce jobs and income in the local area by attracting visitors and stimulating the development of recreation-related businesses, such as motels and restaurants. Informal recreation activities available on Natural Resource Conservation lands could also help attract visitors and enhance development of recreation-related businesses. In addition, adoption of this alternative would increase the attractiveness of the area and the quality of life in the area. This might help attract business and industry to the area, providing positive economic impacts on the local and regional economy, especially in the longer term. As discussed in Section 4.10, the decrease in the amount of land available for Developed Recreation could negatively affect recreational boating and related businesses. This could possibly cause some negative impacts on the local economy.

Economic impacts are speculative and will depend on the nature of any future development proposal. However, as reiterated in this section, different alternatives provide different levels of economic impact. Industrial, commercial, and residential development provides jobs and an increased tax base. A clean, natural environment can encourage both businesses and people to settle in the area, providing a positive impact to the economy.

Impacts Related to the IRM Plan - Although it is difficult to determine economic benefits from IRM activities, the implementation of the proposed IRM Plan would increase the overall benefits of TVA lands to the public, regardless of which alternative is chosen.

4.13.1. Environmental Justice

Alternative A - No Action Alternative; Under Alternative A, the No Action Alternative, there would be no change in parcel allocations from their current designations. Therefore, no change in the current situation with respect to environmental justice is likely. The minority population in the area is small, but poverty levels are high in places, especially in Meigs and Rhea Counties, as discussed in Section 3.13. Specific land use proposals could potentially have significant environmental justice impacts. These proposals would be evaluated as appropriate during the environmental review process. Significant cumulative impacts could occur if several tracts were developed, even if no single development caused significant impacts. However, the extent and degree of such impacts would depend on the specific proposals, which are unknown at this time.

Alternative B - Balanced Economic Development and Recreation: Implementation of Alternative B would increase the amount of land available for Economic Development and decrease the amount available for Developed Recreation and for Natural Resource Conservation (see Section 4-13 above). The net effect of this situation would be decreased access to public lands for both formal and informal recreation. This situation would likely affect disadvantaged populations more than others because these populations, especially low-income populations, would be less able to afford local recreation alternatives. This group is also less able to travel to other locations for recreation. Such effects could be locally significant. Significant cumulative impacts could occur if several tracts were developed, even if no single development caused significant impacts. However, the extent and degree of such impacts would depend on the specific proposals, which are unknown at this time.

Alternative C; - Balanced Conservation and Recreation; Under Alternative C, additional acreages would be made available for informal public recreation as compared to the other

alternatives. Thus, adoption of Alternative C would provide public lands that would be accessible and affordable for more people, including disadvantaged populations. Although there would be a loss of 558 acres available for Developed Recreation purposes, land available for Natural Resource Conservation, which provides many informal recreation opportunities, would increase to 5,288 acres. The magnitude of such impacts would depend on the specific conditions associated with the land use proposals.

4.14. Air Quality

With respect to the Watts Bar Plan, the greatest potential for air quality effects is from industrial and commercial development, i.e., industrial operations, on Zone 5 properties. Activities, either current or future, associated with Zone 6 (Developed Recreation) are not likely to cause any significant impacts to local air quality. Likewise, activities occurring on the remaining zones (Zones 2, 3, 4, and 7) are not likely to generate any noticeable amount of air emissions, and thus are not likely to cause any significant effects to air quality.

For purposes of analysis, the potential for adverse air quality effects was assumed to be correlated to the amount of acreage available for industrial development, i.e., the acreage allocated to Zone 5. At this time, predictions of the nature of air emissions from industries that might locate on Watts Bar land tracts would be and speculative. Any industry seeking to operate a facility that involves Watts Bar lands would be subject to various federal, state, and local regulations (see Section 3.10). Thus, from a regulatory standpoint, air quality impacts from industrial or commercial operations on Zone 5 areas would not be significant.

Alternative A - No Action Alternative; Under Alternative A, the 1988 Plan would remain in place. This plan currently guides land use decisions on TVA public land surrounding Watts Bar Reservoir. The 1988 Plan used 19 allocation categories, which would continue to be used by TVA to make land use decisions. A total of 1,471 acres could be considered for Economic Development. An appropriate level of environmental review would be done to document the extent of expected air quality impacts whenever a proposed land use request is received. Each such review that involved a tract in or potentially affecting a nonattainment area for ozone and/or PM-2.5 would require a conformity applicability determination pursuant to regulations implementing Section 176(c) of the Clean Air Act to assure compatibility with measures in local plans for achieving attainment. Although there could be some minor decrease in air quality under Alternative A, any effects are expected to be insignificant.

Alternative B - Balanced Economic Development and Recreation; Under Alternative B, TVA would update land allocations using resource data, computer analyses, stakeholder input, and TVA staff input to generate a proposed mix of land allocations. Under Alternative B, 2,278 acres would be allocated to Zone 5, Economic Development. This would likely increase the potential total air pollutant emissions compared to Alternative A. As with Alternative A, an environmental review would be performed for each expansion or development proposal to document the extent of expected air quality impacts. If a nonattainment area is involved, the same conformity applicability determination as stated for reviews under Alternative A would also be required. Although there would be a higher potential for adverse effects to air quality under Alternative B, these effects would be held to insignificant levels by regulatory standards.

Alternative C - Balanced Conservation and Recreation: Under Alternative C, only 52 acres would be allocated to Zone 5. As with Alternatives A and B, the appropriate

environmental review would be performed for any expansion or development proposal to document potential impacts on air quality. The small acreage so allocated would be much less than for either Alternative A or Alternative B, and the potential for air pollution would likely be proportionally smaller. Because of the small amount of acreage involved and because of regulatory controls, industrial development under Alternative C is not expected to result in any significant effects to air quality.

4.15. Other Issues - Noise

The greatest potential for community noise impacts comes from industrial and commercial development, commercial transportation, and, to a lesser extent, from commercial recreational development. In the land use allocations in Alternatives C, the potential for community noise impacts are substantially reduced because of the large potential decrease in land available for noise-producing activities compared to Alternative A and B. Under Alternatives A and B, the land available for Zone 5, Economic Development, could be the original 1,471 acres (Alternative A) or an increase to about 2,278 acres (Alternative B). Any potential increase would likely not be in close proximity to large existing residential areas, therefore the potential for increased noise effects would be insignificant.

Maximum land allocated for Developed Recreation will decrease if either Alternative B or C is approved. These reductions range from 498 acres for Alternative B and 558 acres for Alternative C.

Noise from new residential development should follow the established noise patterns of the reservoir. New residents will use the reservoir for recreation, such as boating, at the same time current users do, usually in the warm months and on weekends. This would cause an insignificant effect on the noise environment.

Under Alternative C there is a substantial increase in the land allocated to natural resource conservation. This would decrease the potential for noise effects in those allocations.

Overall based on the amount of TVA public land available for development and the additional environmental evaluations, there would be an insignificant increase in the potential for community noise impacts from implementation of alternatives Alternative A or B; Alternative C would have the least impacts.

4.16. Unavoidable Adverse Effects

Because of the requirement that site-specific environmental reviews will be conducted prior to implementation, there are currently few, if any, adverse environmental effects which cannot be avoided should any Alternative be implemented. However, regional development trends, such as residential shoreline development, will continue to result in losses of aquatic and terrestrial habitat regardless of which alternative selected.

4.17. Relationship of Short-Term Uses and Long-Term Productivity

Commitments of the shoreline to shoreline access, commercial, industrial, and some types of recreational development are essentially long-term decisions that would decrease the productivity of land for agricultural, forest, wildlife, and natural area management. Long-term productivity decreases would likely be greatest under Alternative B and to a lesser

extent under Alternative A. As described in earlier sections, the types of changes that occur with residential development would result in a decline in the habitat quality for some terrestrial species and increase the habitat for others. Many of the water-related impacts of shoreline development could be minimized by the use of appropriate controls on erosion, added nutrients, and pesticide input.

Increased residential development could occur under all alternatives and result in population increase along the shoreline. New jobs and income would be generated by the spending activities of these new residents, leading to enhanced long-term socioeconomic productivity. This would be the case as long as the desirable features that prompted their move to the shoreline were maintained or enhanced.

4.18. Irreversible and Irretrievable Commitments of Resources

Irretrievable use of nonrenewable resources (i.e., fuel, energy, and some construction materials) could occur under all of the Alternatives due to residential shoreline development as well as commercial, industrial, and some types of recreational development. The residential development would result in region-wide population increase. This means that the same development could occur somewhere else in the region. Therefore, use of most (if not all) of these resources could occur somewhere else in the region to provide the same residential development services regardless of the alternative chosen.

As shoreline is converted to residential, commercial, industrial, and some types of recreational use, the land is essentially permanently changed and not available for agricultural, forestry, wildlife habitat, natural area, and some recreation uses in the foreseeable future. This is an irreversible commitment of land which would occur under all alternatives; over the long term, it would likely be greater in magnitude under Alternative B.

4.19. Energy Resources and Conservation Potential

Energy is used by machines for fuel to maintain grassy areas on the TVA project lands, such as the dam reservation, and by the operation of the TVA power producing facilities located on Watts Bar Reservoir. There are no short-term energy uses required for TVA project lands as they are already established.

Energy is also used by machines to maintain areas set aside for Natural Resource Conservation. Although these activities are not likely to have much influence on regional energy use demands either, there would be some short-term energy use for fuel to conduct prescribed natural resource conservation activities, such as mowing, timber management, controlled burning, disking, planting of small grain crops, etc. Alternative C would have a greater requirement for this type of energy use, since it contains the largest amount of acreage allocated for Natural Resource Conservation.

Comparable amounts of TVA public land (22 percent) are allocated to Zone 3, Sensitive Resource Management, under all three alternatives. Some areas set aside for protection of archeological sites could potentially be maintained by mowing, light disking, or controlled burning. There would be some short-term energy use of fuel for machines to conduct these types of activities. The level of these activities is considered minimal.

4.20. Summary of TVA Commitments and Proposed Mitigation Measures

The following commitments would be considered in preparing the Record of Decision for the Final Environmental Impact Statement.

- All soil-disturbing activities, such as dredging, shoreline excavations, etc., would be conducted in a manner to avoid impacts to cultural resources.

- The construction of water use facilities and shoreline alterations within the marked limits of the safety landings and harbors would be prohibited.

- Requests for water use facilities on shoreline immediately upstream and downstream of the safety landings and harbors would continue to be reviewed to ensure that barge tows would have sufficient room to maneuver in and out of the safety landings and harbors without the risk of damaging private property.

- Because caves are extremely fragile and biologically significant, TVA has placed and would continue to maintain protective buffer zones around the known caves on TVA public land on Watts Bar Reservoir.

- As necessary and as practicable, visual buffers, between 50 feet and 100 feet wide, will be provided to screen timber harvest areas and commercial development from public thoroughfares and shorelines.

- Best Management Practices will be used on all soil disturbing activities.